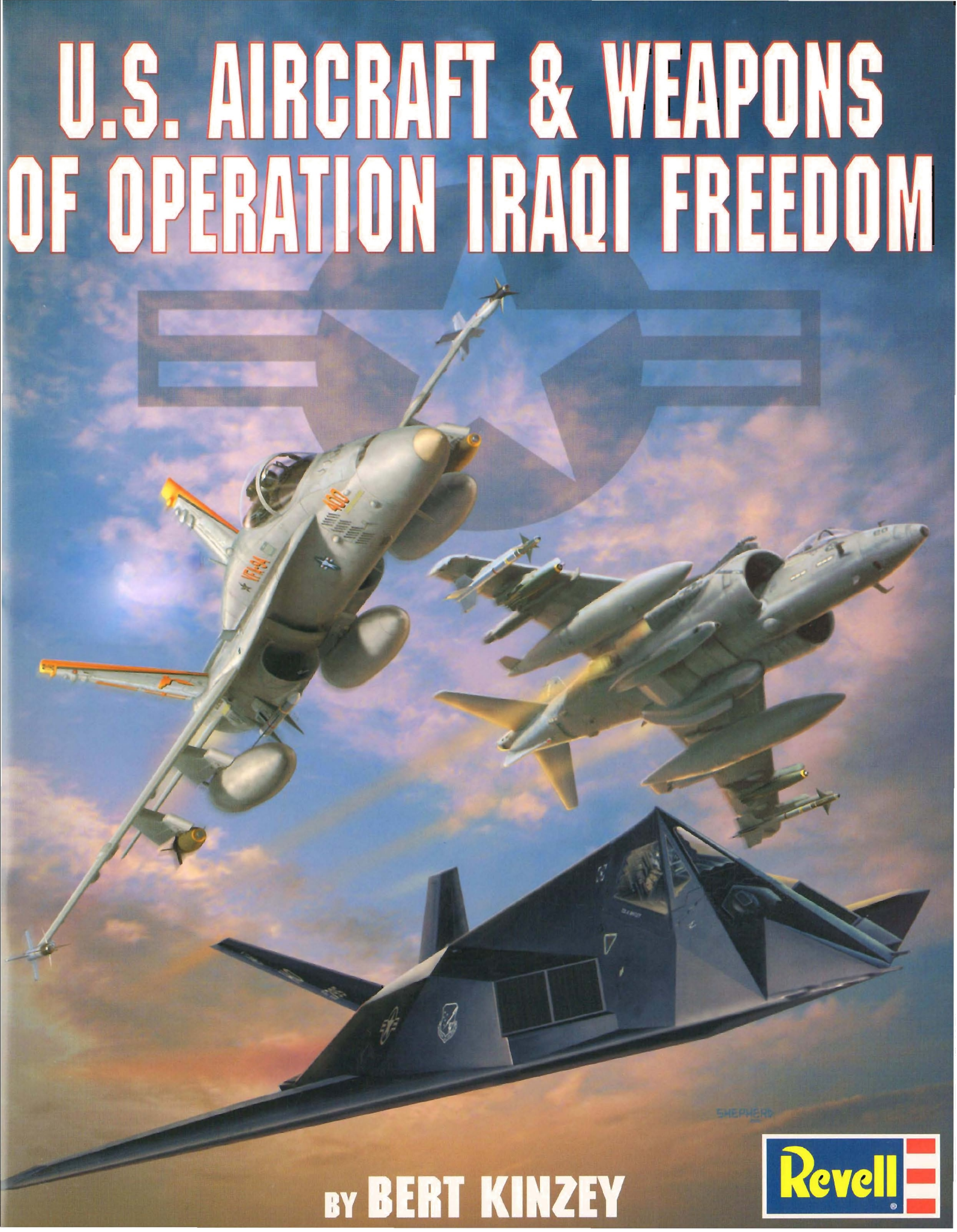
U.S. AIRCRAFT & WEAPONS OF OPERATION IRAQI FREEDOM



BY BERT KINZEY

Revell

U. S. AIRCRAFT & WEAPONS OF OPERATION IRAQI FREEDOM

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Revell®
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A DETAIL & SCALE AVIATION PUBLICATION

by Bert Kinzey

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DEDICATION

This book is dedicated to all members of the United States armed forces who took part in Operation Iraqi Freedom. Their deeds and sacrifices saved countless lives by ending a regime that had killed tens of thousands of innocent people in Iraq. Their victory was the first step in bringing peace and freedom to that nation.

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Above: The pilot of an AV-8B Night Attack Harrier assigned to the Flying Tigers of VMA-542 gets the signal to launch from the flight deck of USS BATAAN, LHD-5. A GBU-16 laser guided bomb is loaded under each wing. The AV-8B Night Attack Harrier has a shorter nose than the AV-8B II+, as illustrated on page 22. (USMC)

Front cover: Art by Stuart Shepherd includes an AV-8B Night Attack Harrier, an F/A-18C Hornet, and an F-117A Nighthawk, thus representing the three services of the United States armed forces that participated in the air campaign of Operation Iraqi Freedom.

INTRODUCTION

A B-2A Spirit stealth bomber is ready for its next mission over Iraq as it sits on the ramp at Diego Garcia in the Indian Ocean. B-52H Superfortresses, representing a bomber design of a half-century earlier, line both sides of the ramp in the background. Both bombers played important roles in Operation Iraqi Freedom. (USAF)

Before Operation Iraqi Freedom began, liberal politicians, Hollywood entertainers, and anti-war activists proclaimed that America would pay a terrible price in a war to overthrow the regime of Saddam Hussein. They pointed out that Operation Desert Storm only intended to expel Iraq from Kuwait, but this time the goal would be the complete capitulation of the Iraqi armed forces and overthrowing Hussein's government. Iraqis would be fighting for their homeland, not just to remain in neighboring Kuwait. Although no one predicted defeat for the American military and its Coalition allies, they projected that the war would be prolonged, taking may months and probably more than a year. They estimated that anywhere from two thousand to ten thousand Americans would be killed in combat, and many more would be injured or captured. They also predicted that the widespread and strong support for the war by the American public would quickly falter when soldiers "began returning in body bags," as California's Senator Dianne Feinstein stated.

Special Operations Forces entered Iraq on March 19, 2003, and the first American and British ground forces pushed northward across the border between Kuwait and Iraq on the following night. On April 5, just two and one-half weeks later, U.S. forces entered Baghdad, and the following day, air supremacy was declared over all of Iraq. On April 9, the brutal regime of Saddam Hussein ended, and on April 14, major military operations also ended. The war, and its goals of destroying the Iraqi military and removing Saddam Hussein from power, had taken less than a month. Less than two-hundred Americans had lost their lives in combat. Further, innocent Iraqi citizens would no longer be tortured and killed by the hundreds and even the thousands by Hussein's henchmen. On April 16, less than one month after the war had begun, humanitarian relief flights were landing in Bashur to begin helping the Iraqi people rebuild their country and eventually govern themselves.

The unbelievably quick military success of Operation Iraqi Freedom, which surprised even the most optimistic experts and observers, was due to many factors including superb planning and the unselfish and dedicated professionalism of the U. S. armed forces, and those of Great Britain and Australia. Their execution of all aspects of the battle plan was excellent and quickened the inevitable outcome of the war while minimizing loss of life on both sides.

One of the most important reasons that Operation Iraqi Freedom was concluded so quickly and successfully was the planning and execution of the air campaign. Never before in the history of warfare, including Operation Desert Storm, had the air campaign played such an important part in the successful outcome. The strategies and tactics used in the air war illustrated a complete change in thinking about how airpower would be used in combat, and it was air power that proved to be the single most important factor in bringing a quick end to the combat while assuring that the goals of removing Saddam Hussein from power and destroying his armed forces were accomplished.

Considering the importance of the air campaign in Operation Iraqi Freedom, it is unfortunate that the American people were so misled by the news media about what was taking place. While coverage of the ground forces was greatly improved over that of Operation Desert Storm, mainly through of the use of imbedded reporters that went along with the Army and Marine units, the media's coverage of the air campaign was inaccurate and misleading. Americans were given a daily dose of huge explosions in Baghdad in what was called the "shock and awe" air campaign. The news media concentrated on the bombing of Baghdad and strikes to decapitate the command and control network of Saddam Hussein and his military. Yet the missions flown over Baghdad and the weapons expended in these strikes represented less than three percent of the air campaign. Further, they did not even represent the primary focus of the campaign. Although important, they illustrated the old thinking concerning the purpose and use of military airpower. Operation Iraqi Freedom represented the new thinking and emphasis as had Operation Desert Storm a decade earlier.

To fully understand the strategies for the use of airpower in the twenty-first century, it is necessary to briefly review the evolution of that strategy over the last sixty years. During World War II, the U. S. Army Air Forces mounted a massive strategic bombing campaign against Germany. B-17 Flying Fortresses and B-24 Liberators, along with thousands of medium bombers, darkened the skies over Europe in an effort to destroy strategic targets. Fighters were charged primarily with gaining and maintaining air superiority so the bombers could do their work. In a secondary role, fighters also supported the ground forces, but for the most part, the primary goal of the air forces was to destroy Germany's war-making potential.

The same was true of the U. S. Army Air Forces role against Japan. After first stopping Japanese expansion and then gaining a foothold in the southwest Pacific, a huge strategic bombing campaign was mounted against Japan. B-29 bombers reduced most of the Japanese industry and war-making capabilities to ashes. In both Europe and the Pacific, the strategic use of airpower was seen to be a key factor in achieving overall victory.

The final blows of World War II were delivered by B-29s when they dropped atomic bombs on Hiroshima and Nagasaki. This ended that war, but it ushered in the nuclear

Weapons are loaded on aircraft of Carrier Air Wing Three on the flight deck of USS HARRY S. TRUMAN (CVN-75). In the right foreground is the CAG F/A-18A+ Hornet of Marine squadron VMFA-115, while to the left are F/A-18C Hornets of Navy squadron VFA-105. The EA-6B Prowler is the CAG aircraft from VAQ-130, and the S-3B Vikings are assigned to VS-22. In the background is an E-2C Hawkeye from VAW-126, and the C-2A Greyhound to the far left is part of VRC-40. (U. S. Navy)

age. Strategic bombing had an awesome new weapon, one that seemed to mean an end to conventional warfare.

In the years following World War II, the newly formed U. S. Air Force concentrated on developing new long-range bombers that could deliver nuclear weapons over great ranges. Combined with aerial tankers, the bombers could strike anywhere on the globe, and the strategy was to create such an awesome force of bombers that no nation on earth would ever attack the United States. By the early 1950s, the Strategic Air Command rightfully claimed to be the most powerful military force in the world. But America's nuclear superiority soon became a nuclear balance as the Soviet Union began developing its own nuclear weapons and bombers.

Even fighter aircraft developed for the U. S. Air Force during that time frame reflected the emphasis on strategic airpower in the nuclear age. Fighter-interceptors, designed exclusively to intercept enemy bombers and defend the airspace of the United States and Europe, soon replaced the air superiority fighters like the F-86 Sabre. Fighter-bombers, with capabilities for both air-to-air combat and attacking targets on the ground, likewise emphasized the strategic mission of the Air Force. As far back as the F-84G Thunderchief, the ability to deliver a tactical nuclear weapon was designed into the fighter-bombers. The F-105 Thunderchief even had an internal bomb bay to carry such a weapon.

The war in Korea clearly demonstrated that the requirement to wage conventional warfare still existed, but the lesson seemed to have little impact on the Air Force's leadership which saw supporting ground operations as a waste of air assets. A decade later, Air Force aircraft proved to be woefully inadequate for supporting ground operations in a conventional war during the early years in Vietnam. As a result, the Air Force found itself in the embarrassing situation of having to acquire surplus Navy A-1 Skyraider attack aircraft to perform this mission. This was followed by the development of the Air Force's own version of the Navy's A-7 Corsair. Air Force versions of the Navy's F-4 Phantom eventually replaced F-105 Thunderchiefs in the skies over North Vietnam as part of the bombing campaign. B-52s, originally designed to deliver nuclear weapons against targets in the Soviet Union, performed the tasks of carpet bombing enemy troops in the jungles or hitting more strategic targets in North Vietnam.

By the end of the war in Vietnam, the Air Force had begun to learn the lesson that there was more to air power than just striking strategic targets. Accordingly, they began development of their first true attack aircraft in the form of the A-10. More ground attack capability was added to the new types of fighters like the F-16 Fighting Falcon. The F-15E Strike Eagle was developed to employ precision guided weapons against a wide variety of targets. While SAC's bomber force continued to shrink, the percentage of fighters with ground attack capabilities continued to grow. Fighters and bombers alike were given the ability to deliver precision guided weapons against all types of targets from tanks to the strategic targets in Baghdad. This capability was also added to Navy and Marine aircraft as well.

In Operation Desert Storm, the emphasis for the employment of air power had shifted from strategic targets to destroying the Iraqi Army in the field. While strategic targets, like command bunkers and buildings housing various Iraqi ministries and headquarters were attacked, the large majority of the weapons were dropped on tactical targets. General Charles Horner, who commanded the air campaign of Desert Storm, stated that the primary goal was to destroy the Iraqi military in the field, and that is exactly what happened.

In Operation Desert Storm, less than ten percent of the weapons delivered by aircraft were precision guided. Further, relatively few of the aircraft could deliver them. But those that could, like the Air Force's F-111F Aardvark and F-117A Nighthawk, and the Navy's A-6E Intruder and F/A-18 Hornet, accounted for far more targets destroyed than the larger numbers of other aircraft like the F-16 Fighting Falcon. Although F-15E Strike Eagles did participate in what has become known as Gulf War I, they did so with very limited capability to deliver precision guided weapons. This was because the LANTIRN (Low Altitude Navigation and Targeting Infrared for Night) targeting pods had not reached operational capability.

But by the time Operation Iraqi Freedom began, the ability to deliver laser-guided bombs had been added to almost all combat aircraft. Further, the new Joint Direct Attack Munitions (JDAM) had been developed. These used Global Positioning System (GPS) satellites to accurately attack stationary targets. The percentage of precision guided munitions (PGM) expended rose from about six percent in Operation Desert Storm to sixty seven percent in Operation Iraqi Freedom. An analysis of the numbers of the various types PGMs used during Operation Iraqi Freedom (see page 38) clearly shows that most were smaller weapons used against targets like tanks and armored vehicles rather than strategic targets. For the first time in the history of warfare, airpower had become an integral and indispensable part of the offensive operations. This is precisely why Operation Iraqi Freedom was so successful and was concluded so quickly. It is also why there were so few casualties among Coalition ground forces. While retired military officers, still routed in the old concepts of how to use ground forces and airpower, complained on television that there were not enough ground forces in Iraq, those that were there advanced rapidly and successfully as they worked in consort with an air campaign having the primary mission of destroying the Iraqi forces they faced in combat.

This use of airpower is not the same as close air support (CAS) which has been used for many years. Except for the early years of World War I, some air assets have always been used to directly support ground troops. Flying at low level and in direct communications with the forces they were supporting, aircraft flying CAS missions were part of the ground war only in the local sense of the word. But the new PGMs allowed the aircraft to fly high above the battlefield and deliver their weapons with pinpoint accuracy against the smallest targets. This not only meant that less aircraft and fewer weapons were required to do the job, it also meant that the aircraft and pilots could remain well above small arms fire and much of the anti-aircraft artillery (AAA) fire that threatened aircraft flying at the low altitudes required to accurately deliver conventional weapons. Further, the strategy of the air campaign was not limited to supporting ground forces in direct contact with the enemy. Instead, the emphasis on destroying the Iraqi Army began with the start of the war and continued until it was over. Republican Guard divisions and other Iraqi Army units were pounded relentlessly twenty-four hours a day long before advancing U. S. Army and Marine units ever got to them. The ground units often came in contact with the enemy forces after air attacks had reduced their numbers and fighting ability by more than fifty percent.

The necessity to strike strategic targets will always be part of any air campaign, but the emphasis has clearly shifted to destroying the enemy's military forces. Airpower is now truly part of the overall offensive operations rather than being limited primarily to the destruction of strategic targets as the news coverage of Operation Iraqi Freedom indicated.

The other problem the media had in covering the air campaign was not a new one. Technical inaccuracies about aircraft, weapons, and their capabilities were both frequent and flagrant. Even simple matters, including identifying types of aircraft and weapons, were incorrectly reported over and over again. One anchor spent much time reporting on a specific type of aircraft that was not even used in the war. In fact it is no longer operational in the U. S. inventory. Reports had both F-117A Nighthawk stealth fighters and A-10A Warthogs operating from U. S. Navy aircraft carriers, but these two aircraft are operated only by the U. S. Air Force, and they are not capable of conducting operations from aircraft carriers.

But covering the air campaign with today's modern and technologically advanced weapons is far more involved than correctly identifying aircraft types and knowing what they do. Reporters constantly talked about weapons like the JDAM, not understanding how they worked or even the fact that the JDAM is not merely one type of weapon. In fact, JDAM is actually a GPS guidance kit attached to one of several standard bomb warheads. One television news network continually showed a standard Mk 84 2,000-pound bomb and claimed it to be a JDAM. It's website showed the same Mk 84 and identified it as a JDAM. That website also included aircraft and weapons that were not used in the war while leaving out those that were. Much of the information provided by the site, as well as on the air, was inaccurate and inconsistent.

The news media's problem with technical inaccuracies, which was just as bad during Operation Iraqi Freedom as it had been in Operation Desert Storm, stems from the fact that the media refuses to obtain any technical experts to help them with their reporting. Instead, they parade out a long line of retired military generals and other high-ranking officers. While retired generals may be helpful in understanding planning, tactics, and strategy, they are not technical experts. Instead, when they were on active duty, they had a staff of experts to keep then advised on the technical aspects of weapon systems. During the coverage of the war, some of the people hired as "experts" and "analysts" by the media made technical mistakes that were as bad as those made by news anchors and reporters. Unless and until the news media recognizes the fact that it needs technical experts as well as retired generals as analysts, this problem of inaccurate reporting on military operations will never be solved.

This monograph is intended to be a concise and accurate guide to the U. S. aircraft and weapons used in the air campaign of Operation Iraqi Freedom. Navy, Marine, and Air Force aircraft are covered, followed by a look at the most important weapons used by these aircraft. Army helicopters are not included, because they were considered to be a part of the ground campaign and in direct support of the local operation of Army units. This is not intended to take anything away from the contributions and valor of Army aviators, because they superbly performed their missions and played an important part in the success of Operation Iraqi Freedom. A brief look at Coalition aircraft flown by the British Royal Air Force, the Royal Australian Air Force, and the Kuwaiti Air Force is included on the final three pages of the book.

This map shows where the Coalition aircraft were based in the Southwest Asia Region for Operation Iraqi Freedom. There were thirteen major bases in seven different countries around Iraq and the Persian Gulf. In the months before the war began, and while it was being conducted, the news media, some politicians, and various anti-war celebrities and groups tried to convince the American and British people that Arab nations were totally against the United States and the United Kingdom. However, all seven of these countries were Arab states. Their cooperation and support during the buildup and throughout the war was exceptional and essential to the rapid and successful execution of the air campaign.

A considerable percentage of air assets were based on six aircraft carriers operating in the Persian Gulf and the Mediterranean Sea. Additionally, Marine AV-8B Harriers and various types of helicopters flew from the smaller LHA and LHD type of amphibious assault ships.

In addition to the air bases in the countries around Iraq and the ships operating offshore, many aircraft flew out of the island of Diego Garcia located to the southeast in the Indian Ocean. These included B-1B Lancer, B-2A Spirit, and B-52H Superfortress bombers as well as P-3C Orions, tankers, and other long range aircraft.

B-52Hs also flew out of the United Kingdom, while some B-2As flew all the way from Whiteman Air Force Base, Missouri, attacked their targets in Iraq, then flew non-stop back to Whiteman AFB in missions lasting well over thirty hours. Coalition aircraft also operated out of Kogainiceanu Air Base, Romania, and Burgas Air Base, Bulgaria.

After the war began, air bases inside Iraq were secured, and Coalition aircraft were quickly moved forward to these bases to remain as close as possible to advancing ground forces. This shortened the flying time required for the aircraft to reach their targets and therefore increased loiter time in the target area. It sometimes had the additional advantage of permitting increased ordnance loads to be carried in place of the higher fuel quantities required for operations from the bases in surrounding countries.

COALITION AIRCRAFT AND MISSIONS FLOWN IN OPERATION IRAQI FREEDOM

U. S. Marine Corps KC-130s fly over the Iraqi desert as one dispenses flares to protect the aircraft from infrared guided surface-to-air missiles. (USMC)

TYPE OF AIRCRAFT	NUMBER DEPLOYED
A/OA-10	60
AC-130	8
AH-1W	58
AH-6	8
AV-8B	70
B-1B	11
B-2A	4
B-52H	28
BQM-34	5
C-130	124
C-17	7
C-2A	10
C-20	3
C-21	7
C-32	1
C-40	1
C-9	5
CH-46	67
CH-47	11
CH-53	54
CN-235	1
DC-130	1
E-2C	20
E-3	19
E-8	7
EA-6B	35
EC-130	8
EP-3E	3
F/A-18	250
F-117A	12
F-14	56
F-15C	42
F-15E	48
F-16C/D	60
F-16CJ	71
F.3	14
GR.3	4
GR.4	30
GR.7	18
HC-130	8
HH-60	16
HS-125	4
KC-1	4
KC-10	33
KC-130	22
KC-135	149
Lynx	6
MC-130	26
MH-47	14
MH-53	31
MH-6	6
MH-60	18
MQ-1	7
MR.2	6
NKC-135	1
P-3	28
PC-6	1
PR.9	2
R-1	1
RC-12	18
RC-135	9
RQ-1	1
S-3B	40
U-2	15
UC-12	3
UH-1	30
UH-3	4
UH-60	3
VC-10	8

SORTIES FLOWN

Total Sorties Flown	41,404*
U. S. Air Force	24,196
Fighters	8,828
Bombers	505
Tankers	6,193
Airlift	7,413
C2 (E-3 & E-8)	432
ISR	452
Rescue	191
Other	182
U. S. Marine Corps	4,948
Fighters	3,794
Tankers	454
ISR	305
C2 (DASC-A)	75
Other	320
U. S. Navy	8,945
Fighters	5,568
Tankers	2,058
C2 (E-2C)	442
ISR	357
Other	520
U. S. Army**	269
ISR	269
United Kingdom	2,481
Fighters	1,572
Tankers	359
C2 (E-3D)	442
ISR	357
Other	1
Australia	565
Fighters	302
Airlift	263

AIR MOBILITY (Tactical In-theater)

C-130 Support (U. S. Air Force)	
Airlift Missions	2,203
Medevac	
Medevac Missions	136
Airborne Paradrop (Personnel)	954

* Does not include Special Operations Forces (SOF), Army helicopter missions, nor Coalition sovereignty flights.

**Only Intelligence Surveillance Reconnaissance (ISR) flown by the U. S. Army are counted as part of the air campaign. Army helicopter flights in support of ground troops are considered to be part of the ground campaign.

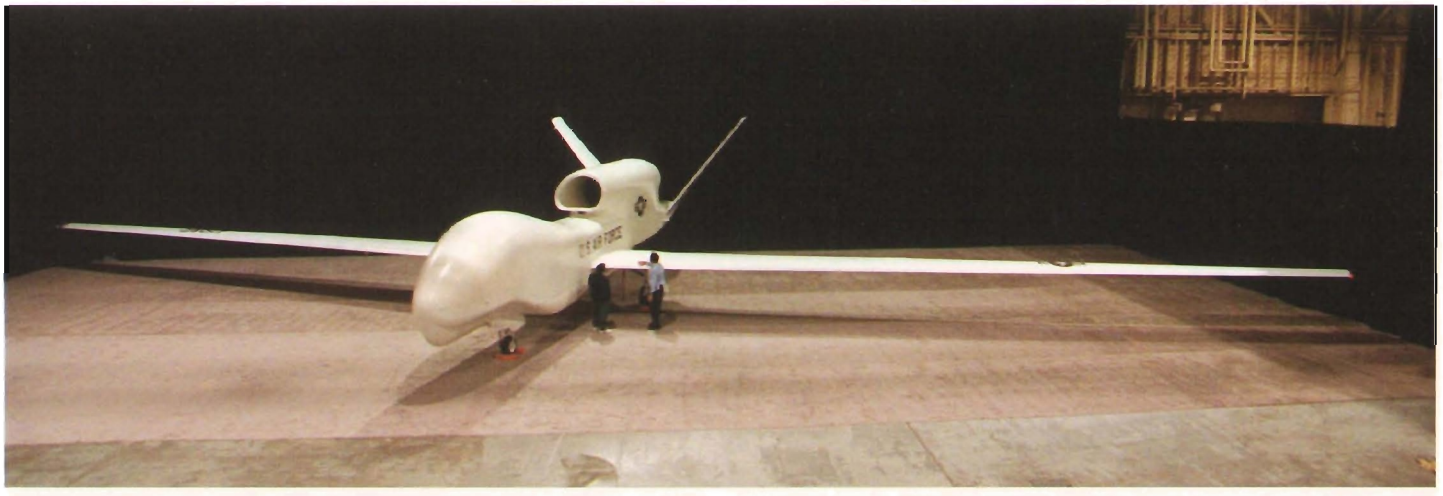
To counter an air attack against Iraq, Saddam Hussein's air force had approximately 20,000 personnel and about 325 combat aircraft in service prior to the start of Operation Iraqi Freedom. Among these were Russian-built MiG-21 Fishbed, MiG-23 Flogger, MiG-25 Foxbat, MiG-29 Fulcrum, and Su-22 Fitter fighters. French-built Mirage F1 fighter were also operational. One squadron of Su-25K Frogfoot attack aircraft posed a potential threat to Coalition ground forces. Additionally, An-24, An-26, and IL-76 transport aircraft and various types of trainers and helicopters were assigned to the Iraqi Air Force. The Iraqi Navy also operated a small number of French and Italian-built helicopters.

The surface-to-air missile defenses were part of the Iraqi Air Force, and these included approximately 200 large air defense missiles and nearly 150 early-warning radars. These were supplemented by numerous gun systems of various calibers and hundreds of small shoulder-fired man-portable air defense (MANPAD) missiles.

No Iraqi Air Force aircraft flew any missions to oppose the air campaign of Operation Iraqi Freedom. Anti-aircraft artillery (AAA) gun sites and small arms fired on Coalition aircraft in 1,224 separate events, and 1,660 surface-to-air missiles, primarily the shoulder-fired MANPAD weapons, were launched. This resulted in the loss of seven Coalition aircraft, including four U. S. Army AH-64D Apache attack helicopters, two U. S. Marine AH-1W Super Cobra attack helicopters, and one U. S. Air Force A-10A Warthog attack aircraft.

In 1991, during Operation Desert Storm, Iraqi fighters that rose to oppose Coalition aircraft where quickly shot down. Those on the ground were destroyed on their air fields or inside their reinforced hangars by laser guided bombs with penetrator warheads. Other Iraqi aircraft fled to neighboring Iran where they were interned. This may explain why no Iraqi aircraft opposed Coalition forces during Operation Iraqi Freedom. Following the war, several Iraqi aircraft were found buried in the sand to protect them from air attacks. A MiG-25 Foxbat is shown here being pulled from where it had been buried at Al Taqaddum air field west of Baghdad.. (USAF)

UNMANNED AERIAL VEHICLES (UAV)



After providing valuable reconnaissance information over Afghanistan during Operation Enduring Freedom, Global Hawk three flew missions over Iraq during Operation Iraqi Freedom. The RQ-4 Global Hawk is a jet powered unmanned aerial vehicle (UAV) capable of making reconnaissance flights at altitudes up to 65,000 feet. It can fly 1,200 miles to an area of operation, remain on station for twenty-four hours, then return to its base. Flying in excess of 300 knots, it can remain airborne up to thirty-five hours. Its sophisticated Synthetic Aperture Radar/Ground Moving Target Indicator can see through clouds and provide near real-time information to commanders. It is also equipped with electro-optical and infrared sensors which can image 40,000 square nautical miles in twenty-four hours. During the war in Iraq, the Global Hawk collected more than 3,700 images that help commanders plan the destruction of the Iraqi Republican Guard. Its missions accounted for fifty-five percent of the information about time-sensitive targets obtained during the war. (USAF)

Above center: Maintenance personnel check out an RQ-1 prior to a mission during Operation Iraqi Freedom. Nine RQ-1 Predator unmanned aerial vehicles (UAV) were used in Operation Iraqi Freedom. A single Predator system usually consists of four UAVs, a ground control station (GCS), and a Predator Primary Satellite Link. Approximately eighty-two people are assigned to each system, and they can keep at least one UAV in the air for sustained continuous operations. (USAF)

Left: In addition to the nine RQ-1s, seven MQ-1s were used during Operation Iraqi Freedom. This version of the Predator has the added capability of employing two AGM-114 Hellfire missiles, giving it a true combat capability. This MQ-1 is shown with its landing gear extended as it returns from a flight with one Hellfire still in place on the pylon under its right wing. The launch rail on the pylon under the left wing is empty. (USAF)

U. S. NAVY

The U. S. Navy deployed six aircraft carriers with their air wings and battle groups in support of Operation Iraqi Freedom. With Carrier Air Wing Eleven (CVW-11) on board, USS NIMITZ, CVN-68, and the guided missile cruiser USS PRINCETON, CG-59, take part in an underway replenishment (UNREP) from USS BRIDGE, AOE-10, while operating in the Persian Gulf on April 10, 2003. (U. S. Navy)

The six Navy aircraft carriers and the assigned air wings and squadrons were:

USS KITTY HAWK, CV-63 (Persian Gulf until April 12)
- Carrier Air Wing Five (CVW-5)
  - VF-154 Black Knights, F-14A
  - VFA-27 Royal Maces, F/A-18C
  - VFA-192 Golden Dragons, F/A-18C
  - VFA-195 Dam Busters, F/A-18C
  - VAQ-136 Gauntlets, EA-6B
  - VAW-115 Liberty Bells, E-2C
  - VS-21 Fighting Redtails, S-3B
  - HS-14 Chargers, SH-60F & HH-60H
  - VRC-30 Providers (Detachment), C-2A

USS CONSTELLATION, CV-64 (Persian Gulf until April 12)
- Carrier Air Wing Two (CVW-2)
  - VF-2 Bounty Hunters, F-14D
  - VMFA-323 Death Rattlers, F/A-18C (Marine Unit)
  - VFA-151 Vigilantes, F/A-18C
  - VFA-135 Kestrels, F/A-18C
  - VAQ-131 Lancers, EA-6B
  - VAW-116 Sun Kings, E-2C
  - VS-38 Red Griffins, S-3B
  - HS-2 Golden Falcons, SH-60F & HH-60H
  - HSL-47 Sabrehawks, SH-60B
  - VRC-30 Providers (Detachment), C-2A

USS NIMITZ, CVN-68 (Persian Gulf from March 25)
- Carrier Air Wing Eleven (CVW-11)
  - VFA-14 Top Hatters, F/A-18E
  - VFA-41 Black Aces, F/A-18F
  - VFA-97 Warhawks, F/A-18A+
  - VFA-94 Mighty Shrikes, F/A-18C
  - VAQ-135 Black Ravens, EA-6B
  - VAW-117 Wallbangers, E-2C
  - VS-29 Dragon Fires, S-3B
  - HS-6 Indians, SH-60F and HH-60H
  - VRC-30 Providers (Detachment), C-2A

USS THEODORE ROOSEVELT, CVN-71 (Mediterranean)
- Carrier Air Wing Eight (CVW-8)
  - VF-213 Black Lions, F-14D
  - VFA-201 Hunters, F/A-18A+ (USN Reserve Unit)
  - VFA-15 Valions, F/A-18C
  - VFA-87 War Party, F/A-18C
  - VAQ-141 Shadowhawks, EA-6B
  - VAW-124 Bullseyes, E-2C
  - VS-24 Scouts, S-3B
  - HS-3 Trident, SH-60F & HH-60H
  - VRC-40 Rawhides (Detachment), C-2A

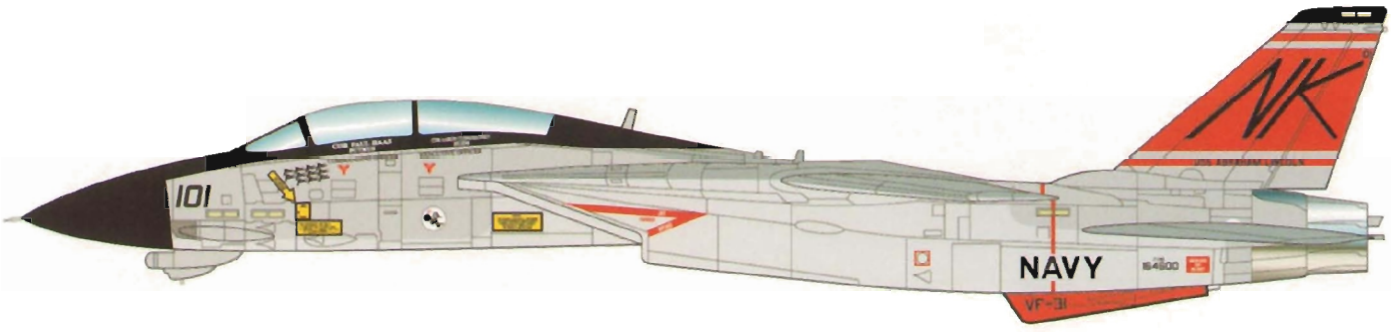
USS ABRAHAM LINCOLN, CVN-72 (Persian Gulf)
- Carrier Air Wing Fourteen (CVW-14)
  - VF-31 Tomcatters, F-14D
  - VFA-115 Eagles, F/A-18E
  - VFA-113 Stingers, F/A-18C
  - VFA-25 Fist of the Fleet, F/A-18C
  - VAQ-139 Cougars, EA-6B
  - VAW-113 Black Eagles, E-2C
  - VS-25 Blue Wolves, S-3B
  - HS-4 Black Knights SH-60F & HH-60H
  - VRC-30 Providers (Detachment), C-2A

USS HARRY S. TRUMAN, CVN-75 (Mediterranean)
- Carrier Air Wing Three (CVW-3)
  - VF-32 Swordsmen, F-14B
  - VMFA-115 Silver Eagles, F/A-18A+ (Marine Unit)
  - VFA-37 Bulls, F/A-18C
  - VFA-105 Gunslingers, F/A-18C
  - VAQ-130 Zappers, EA-6B
  - VAW-126 Seahawks, E-2C
  - VS-22 Checkmates, S-3B
  - HS-7 Dusty Dogs, SH-60F & HH-60H
  - VRC-40 Rawhides (Detachment), C-2A

Above: The new F/A-18E Super Hornet made its combat debut with the Eagles of VFA-115 during Operation Enduring Freedom. Except for the problems with the angled underwing pylons, which increased drag and reduced range, the F/A-18E proved to be quite superior to the earlier Hornet variants. Just as USS ABRAHAM LINCOLN, CVN-72, was heading home from its scheduled deployment, it was ordered to return to the Persian Gulf to support Operation Iraqi Freedom. VFA-115 then continued flying combat missions over Iraq. In this photo, the squadron commander's aircraft taxis across the LINCOLN's flight deck. A GBU-16 laser guided bomb is loaded under its left wing. (U. S. Navy)

Right: During Operation Iraqi Freedom, the CAG aircraft of VFA-115 was painted with the names and crest of fallen New Your City firefighters who gave their lives rescuing victims of the World Trade Center attacks on September 11, 2001. (U. S. Navy)

When USS NIMITZ, CVN-68, arrived in the Persian Gulf on March 25, she brought two more Super Hornet squadrons to the war. The Top Hatters of VFA-14 were embarked with F/A-18Es, and the Black Aces of VFA-41 flew the first combat missions in the two-seat F/A-18F. This actually took place before NIMITZ arrived on station. Several F/A-18Fs flew forward from NIMITZ to ABRAHAM LINCOLN where they were supported by personnel assigned to VFA-115. One of VFA-41's F/A-18Fs is shown here as it is spotted on the flight deck of LINCOLN immediately after returning from the first combat mission. Ordnancemen prepare to rearm it so it can be launched on another mission. (U. S. Navy)

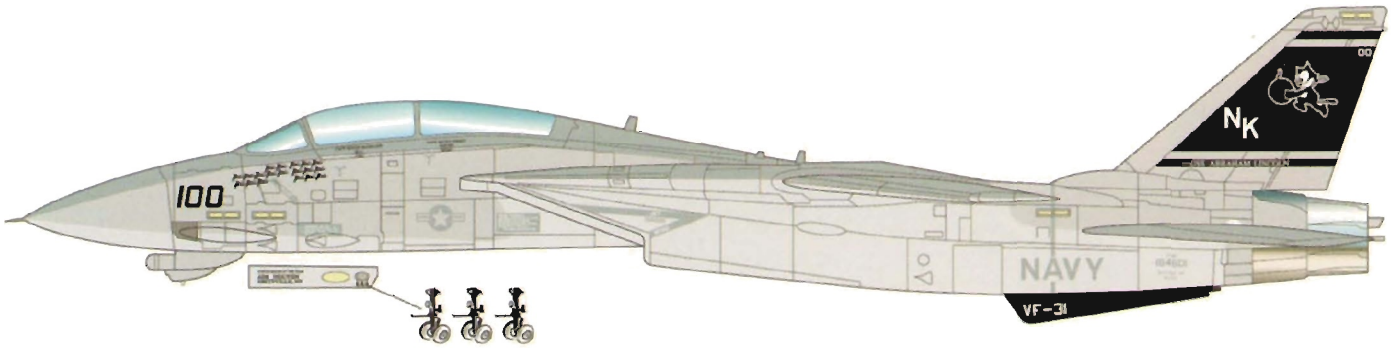


Above: F-14D, BuNo. 164600, was the squadron commander's aircraft for the Tomcatters of VF-31. The squadron operated aboard USS ABRAHAM LINCOLN, CVN-72, during Operations Enduring Freedom and Iraqi Freedom. Scale modelers should note that decals for this aircraft have been produced by Yellowhammer Models and are available from Meteor Productions at meteorprod.com. (Meteor Productions)

Right: A close-up shows the mission markings on the F-14D Tomcat illustrated in the artwork above. Each mission marking is the squadron's "Felix the Cat" insignia carrying a bomb. VF-31 was one of three F-14D units to see combat over Iraq. The others were VF-2 which operated from USS CONSTELLATION, CV-64, and VF-213 aboard USS THEODORE ROOSEVELT, CVN-71. (Klaus)

Above center: The Black Lions of VF-213 flew from USS THEODORE ROOSEVELT, CVN-71, which operated in the Mediterranean Sea. One of the squadron's Super Tomcats is about to launch from Cat Three while an F/A-18C from VFA-87 waits its turn on Cat Four. (U. S. Navy)

Left: The Black Knights of VF-154 flew the only F-14As to see action in Operation Iraqi Freedom. With GBU-16 laser guided bombs and external fuel tanks beneath its fuselage, one of VF-154's Tomcats launches from a waist catapult aboard USS KITTY HAWK. CV-63. (U. S. Navy)



Above: The CAG aircraft for VF-31 had black markings instead of the red used on the squadron commander's Super Tomcat, as shown in the artwork on the previous page. The three nose gear markings are indicative of nose gear failures experienced over the last two years with F-14s. Evidently, this aircraft had three failures. Yellowhammer Models also produces decals for this aircraft, and they can be found on meteorprod.com. (Meteor Productions)

Right: A close-up shows the nineteen mission markings on the aircraft illustrated in the artwork above. Although originally designed exclusively as a fleet defense interceptor, the Tomcat has been transformed into a highly effective fighter-bomber capable of delivering precision guided weapons and conventional bombs. (Klaus)

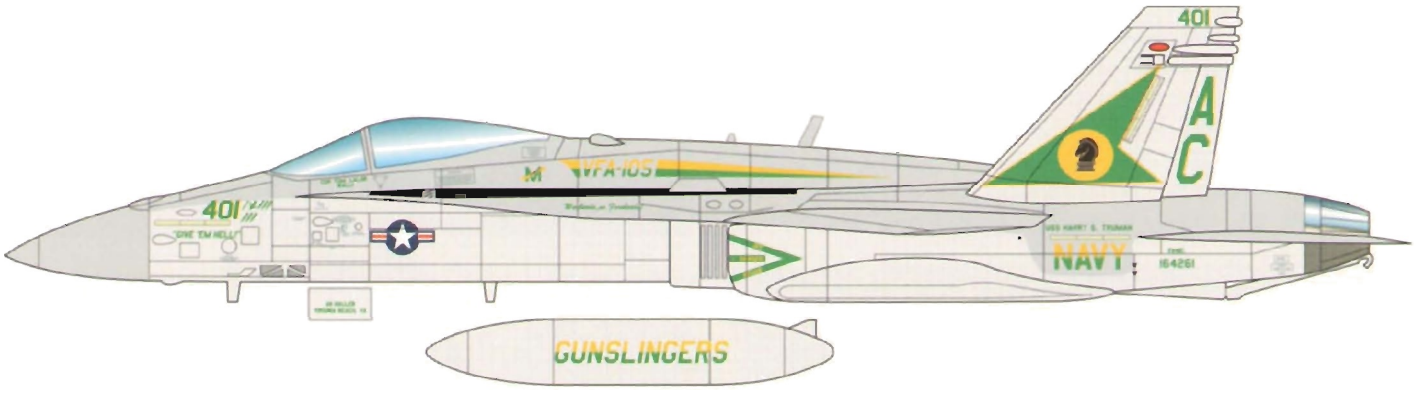
Above center: Final checks are made on the CAG F-14D Super Tomcat of VF-2 before it is launched from one of the steam catapults aboard USS CONSTELLATION, CV-64. The Bounty Hunters still carry the "Langley stripes" on their forward fuselage indicative of their assignment many years ago on the Navy's first carrier, USS LANGLEY, CV-1. (U. S. Navy)

Right: The Swordsmen of VF-32 flew the only F-14Bs used in the war from USS HARRY S. TRUMAN, CVN-75. Here, one of their Tomcats is serviced on the hangar deck between missions. (U. S. Navy)

Above: VFA-87 was one of three F/A-18C squadrons which operated from USS THEODORE ROOSEVELT, CVN-71, during Operation Iraqi Freedom. This artwork depicts the unit's CAG aircraft, and this is the same Hornet shown in the photograph with the F-14D on page 12. Yellowhammer Models has decals for this F/A-18C, as well as the Hornet shown in the artwork on the next page. Scale modelers can order these decals on mete-orprod.com. *(Meteor Productions)*

Right: A close-up shows the mission markings on the forward fuselage of the F/A-18C shown above. These are in the form of tomahawks. VFA-87 is nicknamed "War Party." (Klaus)

Below: An F/A-18C from VFA-25 is hooked up to Cat Four aboard USS ABRAHAM LINCOLN, CVN-72, for a mission over Iraq on April 5. It is armed with two GBU-16 laser guided bombs and two AIM-9M Sidewinder air-to-air missiles. VFA-25 is nicknamed "Fist of the Fleet." (U. S. Navy)



Above: For many years, only the CAG aircraft in each squadron carried a lot of color, while the rest were painted with subdued gray markings. More recently, the aircraft assigned to squadron commanders have been painted with as much color as the CAG aircraft. It should be noted that the aircraft are only sentimentally assigned to the commander of the air group (CAG) and the squadron commander. In reality, any pilot in the squadron can fly any aircraft on a given mission. The artwork depicts the squadron commander's aircraft of VFA-105 which operated from USS HARRY S. TRUMAN, CVN-75. As with the F/A-18C shown on the previous page, Yellowhammer Models makes decal sheets with these markings. (Meteor Productions)

A close-up shows the mission markings on the nose of the aircraft shown above. They indicate one HARM missile launch, one JSOW launch, and six laser guided bombs. (Klaus)

Below: The pilot of an F/A-18C assigned to the Stingers of VFA-113 starts his engines on the flight deck of USS ABRAHAM LINCOLN, CVN-72. The Hornet is loaded with two GBU-35(V)-1B JDAMs. (U. S. Navy)

Above: Each aircraft carrier embarked a squadron of EA-6B Prowler electronic warfare attack aircraft. Two Navy expeditionary squadrons operated from land bases in support of Air Force aircraft, and two Marine Prowler squadrons supported Marine air operations. This beautifully marked EA-6B was the CAG aircraft for the Cougars of VAQ-139. This squadron operated from USS ABRAHAM LINCOLN, CVN-72, during the carrier's extended deployment in support of Operations Enduring Freedom and Iraqi Freedom. It is pictured here as it appeared after it returned to its home base at NAS Whidbey Island, Washington, after the war. (Kinzey)

Right: A close-up of the nose of the Prowler shown above shows mission markings in the form of seven AGM-88 HARM missile silhouettes. (Kinzey)

The CAG aircraft from VAQ-141, prepares to launch from USS THEODORE ROOSEVELT, CVN-71, on the night of March 22. The squadron is known as the Shadowhawks, and a large black hawk is painted on the tail of the Prowler. All EA-6Bs used in the war were the latest Block 89 version which has up-to-date capabilities to jam enemy radars and other types of electronic transmissions. Prowlers remain capable of employing the AGM-88 HARM anti-radiation missile to attack enemy emitters. Flight operations from both land bases and aircraft carriers continued around the clock during Operations Enduring Freedom and Iraqi Freedom. (U. S. Navy)

Although S-3B Vikings did fly a few combat missions during the war, they were used primarily as aerial tankers for Navy aircraft. An S-3B from VS-22 refuels an F/A-18C Hornet assigned to VFA-105. Both squadrons were part of Carrier Air Wing Three aboard USS HARRY TRUMAN, CVN-75. S-3Bs will soon be retired from service, and the Navy's aerial tanking duties will be assumed by F/A-18E and F/A-18F Super Hornets. (U. S. Navy)

Twenty E-2Cs were assigned to squadrons aboard the carriers where they flew airborne early warning and command and control missions. This Hawkeye from VAW-124 is making an arrested recovery aboard USS THEODORE ROOSEVELT, CVN-71. (U. S. Navy)

Detachments of C-2A Greyhounds from VRC-30 and VRC-40 flew cargo, passengers, and mail between shore bases and the six aircraft carriers. With its wings folded, a C-2A from VRC-40 taxis on the flight deck of USS THEODORE ROOSEVELT. (U. S. Navy)

Center left: SH-60F and HH-60H Sea Hawk helicopters operated from carriers flying plane guard search and rescue missions and transporting personnel, cargo, and mail between ships. Here, an SH-60F takes off from USS ABRAHAM LINCOLN, CVN-72. The Hornet in the background is armed with two AGM-84 SLAM(ER) [Enhanced Response) missiles. (U. S. Navy)

Center right: HH-46D Sea Knights moved supplies between replenishment ships and the warships. In this photograph a HH-46D from Detachment 2 of HC-11 and USS CAMDEN moves munitions to the flight deck of a carrier. Squadron members have displayed their pride by painting a huge American flag on the front of the helicopter. (U. S. Navy)

Left: MH-53E Sea Dragon helicopters were designed primarily for Airborne Mine Countermeasures (AMCM), but they also perform shipboard delivery. The pilot of an MH-53E from Helicopter Mine Countermeasures Squadron Fifteen (HM-15) prepares to take off from USS SAIPAN, LHA-2, On March 31. (U. S. Navy)

THE ANCIENT MARINER FLIES A NEW MISSION

The pilot of a P-3C AIP Orion starts his number two engine at Ali Al Salam Air Base, Kuwait, on April 11. The aircraft is assigned to the Grey Knights of VP-46, and this squadron was on its normal deployment to Southwest Asia when the buildup for Operation Iraqi Freedom began. Between December 2002 and March 2003, they flew ISR missions over Afghanistan in support of Operation Enduring Freedom. In December, one of their P-3Cs intercepted an unflagged North Korean ship carrying Scud missiles to Yemen. VP-46 operated out of Bahrain, Masirah, Oman, and Diego Garcia. After the war began, they kept two of their aircraft at Ali Al Salam, while others continued to operate primarily out of Bahrain. (U. S. Navy)

During a war, emphasis is usually concentrated on the new equipment and weapons which are being used for the first time. The hardware developed from new technology and the improved capabilities the advancements have made possible grab all of the headlines in the media, and the military promotes the accomplishments of the new systems and weapons in order to get more support for continuing funding for them. But much of the war is fought by existing systems, some of which are quite old and should have been replaced years ago. The deep spending cuts in military programs made by the Clinton Administration left the armed forces of the United States desperately short in some areas. But the men and women in uniform made old systems perform new missions and rose to the challenges of Operation Iraqi Freedom. The story of the P-3C Orion and EP-3E AIRES aircraft during the war is an outstanding example of taking an old airframe and using it successfully in a new and critical mission. The role played by the VP (maritime patrol) and VQ (electronic intelligence) communities during the war is not one that would receive wide coverage by the media, but it is one certainly worthy of being told, because it exemplifies the remarkable resourcefulness and dedication of the men and women in America's military.

Designed and developed in the late 1950s and early 60s, the P-3 Orion was based on Lockheed's Electra turboprop airliner. It entered service as a land based, long range, maritime patrol and anti-submarine warfare (ASW) aircraft. Soon after the first Orions became operational, they took part in the blockade of Cuba during the Cuban Missile Crisis of October 1962. Flying patrols in the Caribbean Sea and the South Atlantic, Orions located Soviet ships heading for Cuba and helped the U. S. Navy turn them around. They later monitored the ships as they removed the missiles from the island nation just ninety miles off the coast of Florida.

After playing an important role in one of the major crises of the Cold War, P-3s have patrolled the oceans of the world searching for and monitoring the movements of submarines and surface vessels. After the fall of the Soviet Union, emphasis has shifted more to the surveillance of surface shipping, but the anti-submarine role has been maintained. Now, more than forty years after it was introduced into service, the Orion is in need of replacement. Inspections of the airframes have revealed cracks in the main wing spars of every aircraft, the shortest of which is about eighteen inches. Half of the P-3Cs still in service will be retired from service in the next year, yet no replacement is on the horizon.

In November 2002, the Grey Knights of Patrol Squadron Forty-Six (VP-46) left their home base at NAS Whidbey Island, Washington, and flew to Southwest Asia for their normally scheduled six-month deployment to that area of the world. The squadron's aircraft operated primarily out of Diego Garcia in the Indian Ocean, Masirah, Oman, and Bahrain International Airport. Missions included maritime patrol duties searching for suspicious shipping in the Persian Gulf and the Indian Ocean, and in December, one of the squadron's aircraft intercepted an unflagged North Korean ship carrying Scud missiles to Yemen. The Spanish Navy was called in to board the ship and inspect the cargo.

But not all of the flights made by the Grey Knights were

The commander's aircraft of VP-46 displays symbols of the squadron's participation in Operation Iraqi Freedom. These include assisting in the sinking of an Iraqi patrol boat, and providing an eye in the sky above special operations forces that secured oil terminals at the start of the war to prevent them from being ignited and destroyed by Iraqi forces. (C. Kinzey)

The gray AIMS (Advanced Imaging Multi-spectral Sensor) turret can be seen beneath the open radome of this P-3C AIP Orion. When in use, the doors below the turret open, and it is extended downward on the white frame. This sensor was the eye in the sky above Marine forces as they moved north toward Baghdad. The large yellow object is the radar antenna. The small node on the radome is part of the AN/AAR-47 Missile Warning Set installed on AIP Orions. (B. Kinzey)

over water. Missions in support of Operation Enduring Freedom were flown over Afghanistan where the squadron's P-3C AIP aircraft used their sophisticated Advanced Imaging Multi-spectral Sensor (AIMS) to locate and observe the movements of the Taliban and al Quaida. However, only four of the squadron's nine aircraft had the AIP (Aircraft Improvement Program) upgrades, so these four aircraft had to fly all of these missions.

In addition to the AIMS turret, P-3Cs with the AIP upgrades also have the AN/AAR-47 Missile Warning Set (MWS) to detect the plumes of surface-to-air missiles launched against the aircraft. This works in conjunction with the AN/ALE-47 Countermeasures Dispensing System (CMDS) which includes chaff and flare dispensers on each side of the forward fuselage and aft of each main landing gear.

As the forces in the Persian Gulf area were increased in preparation for a war with Iraq, five AIP aircraft and crews, along with maintenance and support personnel, were sent to the area from VP-1, VP-47, and VP-40. This placed fourteen P-3Cs in the theatre, and nine of these were AIP aircraft.

Major changes in the missions flown by Orions began to take place after Operation Desert Storm in 1991. Shortly thereafter, the collapse of the Soviet Union meant that less attention had to be given to anti-submarine warfare. Both P-3Cs and EP-3Es began to focus a larger part of their operations to monitoring Iraqi forces in support of Operation Southern Watch. Then, after the attacks of 9/11, the majority of hours flown by deployed squadrons were Intelligence, Surveillance, and Reconnaissance (ISR) missions in support of Operation Enduring Freedom over Afghanistan. During these missions, the P-3C AIP aircraft would use their new Tactical Common Data Link (TCDL) which allowed near real time transmission of video images from the aircraft to ground stations. This provided commanders on the ground with a live 360-degree view of what their forces were up against.

The success and capabilities of the P-3Cs in Operation Enduring Freedom were seldom, if ever, mentioned in the news media, but they were certainly noticed by the commanders of Marine Corp units and Special Operation Forces (SOF). The long range and endurance of the P-3C meant that continuous ISR coverage could be provided. These commanders requested that P-3Cs fly in direct support of their units to provide over-the-horizon imaging of the battlefield and the enemy as their troops advanced into Iraq. This was quite different from the missions flown in Afghanistan, because the P-3C would now be an integral part of the offensive scheme of maneuver.

To help implement this plan, Marines Corps leaders pushed through a project to build two temporary aircraft parking pads at the already crowded Ali Al Salam Air Base in Kuwait, so that two of the Grey Knight's AIP Orions could be moved closer to where the fighting would take place. This would shorten the distance to where the Marines would be on the ground, and therefore increase the time the P-3C could spend above the ground forces. Other VP-46 aircraft continued to operate from Bahrain, Masirah, Oman, and Diego Garcia. After the war began, P-3Cs based in the Eastern Mediterranean flew missions in support of forces engaged with the enemy in northern Iraq.

As the war began, there was concern that the Iraqis would try to destroy their off-shore oil platforms (GOPLATS) and their pumping stations along the Al Faw peninsula northeast of Kuwait. If they had done so, both military and environmental problems would have been created. VP-46 crews had already been keeping a close watch on the platforms, and plans were developed to work with Special Operations Forces to quickly seize and protect these valuable assets and prevent their destruction by the Iraqis. Even before the war began, a P-3C was watching the Al Faw area as well as the platforms. They continued to provide still imagery, a live video feed, and voice reports on enemy activity in the area. When ground operations began, the P-3C monitored the Iraqi response and provided an eye in the sky above the SOF as they secured the oil fields, oil platforms, and pump-

During Operation Enduring Freedom and Operation Iraqi Freedom, P-3Cs of VP-46 were sometimes armed with AGM-65 Maverick missiles as shown here on March 22, while for other missions, two Standoff Land Attack Missiles (SLAM) were loaded. These weapons gave the crew the ability to attack targets of opportunity, however no situation ever arose where Orions were required to launch a weapon. (U. S. Navy)

The terminal building of the newly renamed Baghdad International Airport is seen beneath the aft fuselage of one of VP-46's P-3Cs when it became the first Navy aircraft to land at the airport after it was captured by Coalition forces. P-3Cs flew missions over Iraq right up until Baghdad was taken. (U. S. Navy)

Two members of the Grey Knights proudly display their squadron's flag and the American flag from the door of their aircraft at Baghdad International Airport on April 16. Pilots and other flight crew members often carried American flags on missions during the war, then sent them to family members and friends. (U. S. Navy)

ing stations.

After this part of the mission was accomplished, the Grey Knights crew continued to sweep and observe the immediate area in the Arabian Gulf. They noticed an Iraqi PB-90 patrol boat hiding next to the exposed bow of one of several partially submerged tankers that lie derelict in the water. They called in their discovery to the Mobile Operations Command Center (MOCC) in Kuwait where the controllers were wearing their full protective gear in response to incoming Iraqi Scud missiles which could be carrying chemical or biological warheads.

The first response was to have British artillery in the area fire on the PB-90, but the patrol boat made a big circle in the water, and the British missed. As the boat was fired upon, several of its crew were seen to jump into the water and begin swimming to Kuwait which was about ten miles away. The PB-90 then tied up to the exposed bow of the sunken tanker again. The crew of the P-3C notified the U. S. Air Force MC-130 which was operating in the area, and it called in an AC-130 gunship which flew in and sunk the Iraqi patrol boat in short order. Although they could not see the gunship arrive overhead in the darkness of the night, the Iraqi crewmen evidently had heard the sound of an AC-130 during Desert Storm. Some quickly jumped overboard before their vessel was destroyed, and a few were later captured. During that single mission, which occurred on the first night of the war, the P-3C coordinated with Special Operations Forces, the U. S. Air Force, and the British, thus illustrating the outstanding cooperation between Coalition forces that was consistent throughout the war.

While this mission was being flown, other P-3Cs were flying above Marine forces as they pushed across the border into Iraqi's Safwan region. These flights often carried Marine officers who observed the imagery from the AIMS turret and radioed the information directly to the units below them on the ground. The Orions, with their crew of eleven plus the two Marines, came under anti-aircraft fire and crews observed the launch of a number of Iraqi surface-to-air missiles. Some aircraft had to take evasive action, a new experience for crews used to flying over great expanses of ocean. Dodging anti-aircraft fire is not as easy nor as effective in a huge, lumbering, four-engine, turboprop as it is in a nimble jet fighter, and it may seem extraordinarily risky to expose such a large and expensive aircraft and so many crewmen to this kind of danger, but the tremendous value of the real time intelligence to the forces on the ground was considered worth that risk. The P-3C AIP had the capability to give unit commanders right down to the smallest level a complete picture of what the enemy was doing all around them, day or night.

As the Marines pushed further and further north into Iraq, P-3Cs remained overhead informing them of enemy troop dispositions and movements. But the advance was rapid, and it bypassed large forces of Iraqis. This meant the Orion crews not only had to face anti-aircraft fire on the front lines above the Marines but also on the way back to their bases when they flew near areas where significant enemy air defense weapons still remained. To avoid these areas, considerable pre-flight planning was conducted to cover ingress and egress routes that posed the least threat to the P-3Cs. The Iraqi air defense fire actually increased as the campaign continued and the forces moved closer to Baghdad. Still, the Orions flew continual patrols above the Marines using their AIMS turret and Tactical Common Data Link to provide them with up-to-the-minute information on the enemy. One of the Grey Knights' P-3Cs became the first Navy aircraft to land at Baghdad International Airport after it was secured by Coalition ground forces.

Although the primary mission of the P-3C during OIC was to provide ISR information to the ground commanders, the aircraft were sometimes armed with two AGM-65 IR Maverick missiles in the event a target of opportunity was found during a situation where other assets were not readily available to destroy it. Preparations were also made to employ the AGM-84E Standoff Land Attack Missile (SLAM) which some P-3Cs had been certified to employ for several years. However, Orions never got the opportunity to fire any weapons, because other aircraft or weapon systems were

Three EP-3E ARIES II (Airborne Reconnaissance Integrated Electronic System II) aircraft also flew missions over Iraq gathering signals intelligence (SIGINT) as the ground forces moved toward Baghdad. An EP-3E was previously in the headlines in April 2001 when a Chinese fighter collided with it while it was operating in the Southwest Pacific. This forced the badly damaged EP-3E to make an emergency landing at a Chinese base where the crew was interned for several days until they were eventually released. (U. S. Navy)

always available that could destroy targets more effectively.

Without question, the ISR missions flown by P-3Cs in direct support of offensive operations on the ground played a critical part in helping achieve a quick and decisive victory. The bravery of the crews, flying through anti-aircraft fire in a large and relatively slow aircraft that had no ejection seats nor the armor associated with combat aircraft, should be cited as an example of the dedication of the men and women in America's military. But the efforts of the support personnel should likewise be mentioned. Sophisticated military aircraft and systems require enormous amounts of maintenance and servicing, and this is always compounded when the aircraft is old and still serving well past the time it should have been replaced. Even superhuman efforts of maintenance crews are often not enough to keep an old aircraft in the air as much as needed, especially when there is a shortage of spare parts to deal with as well. But the dedication and professionalism of the support and maintenance personnel helped the P-3Cs achieve a mission capable rate during the war that was higher than normal peacetime rates.

The VQ community, flying EP-3E ARIES II aircraft, were likewise fully integrated into Operation Iraqi Freedom. Unfortunately, only two squadrons with these important ELINT aircraft remain, and only six of the latest EP-3E SSIP (Sensor System Improvement Program) aircraft are in the active inventory. Three of these were committed to the support of Coalition forces, and they were flown almost constantly throughout the war. Clearly, several times this number of EP-3Es was needed, but the Navy was forced to do what it could with a continually decreasing number of aging assets. What the men and women of VQ-1 and VQ-2 accomplished was nothing short of phenomenal.

The EP-3 was originally developed for theater and strategic level reconnaissance of signal intelligence (SIGINT). However, cutbacks in intelligence gathering assets during the 1990s resulted in a large and unacceptable gap in tactical-level SIGINT capabilities. This shortcoming was noticed during Operation Enduring Freedom in Afghanistan. Although not designed nor equipped for this mission, the EP-3Es were pressed into service to fill the void. The incredible adaptability, resourcefulness, and determination of the VQ community to accomplish this mission continued into Operation Iraqi Freedom.

Since the end of Operation Desert Storm, EP-3Es had flown many missions monitoring Iraqi actions as part of Operation Southern Watch. They listened to Iraqi communications and evaluated Iraqi responses to sorties flown by combat aircraft as part of Operation Southern Watch.

Like their cousins in the VP community, EP-3Es found themselves flying missions over land in both Operation Enduring Freedom and Operation Iraqi Freedom. Moving one echelon behind the P-3Cs that were flying directly above the advancing ground forces, Combat Readiness Crews (CRC) in the EP-3Es provided real time signal intelligence to commanders on the ground. While the P-3C provided the eyes with its AIMS turret, the EP-3Es were the ears of the force as they monitored enemy command and control communications. They located numerous Iraqi forces that threatened Coalition ground units, and they called in strikes on the enemy positions. EP-3Es also helped direct combat search and rescue (CSAR) assets to the successful rescue of downed airmen. In one incident, they directed the extraction of a Marine element that had been pinned down by Iraqi forces. They also discovered previously unknown threats to Coalition aircraft and diverted the flights safely around them.

Operation Iraqi Freedom demonstrated both the adaptability and the importance of a large long range patrol aircraft loaded with special sensing and electronic equipment to perform a wide variety of missions. Both the P-3C and EP-3E brilliantly performed new missions during the war, being limited only by their few numbers and advancing age. P-3Cs had a mission capable (MC) rate of 82.0 percent during the war, while EP-3Es had an MC rate of 72.3 percent. One of the critical needs of the Navy is to replace these aircraft. Yet the decision on a replacement, one that should have been made ten years ago, has yet to be made. In all likelihood the future of the VP and VQ communities will be divided between a new manned aircraft and unmanned aerial vehicles (UAV). Until that happens, the men and women now flying and maintaining the P-3C and EP-3C can take great pride and satisfaction in a job well done during Operation Iraqi Freedom.

MARINE AIR OPERATIONS

Members of the 24th Marine Expeditionary Unit spell out* 24 MEU PROUD! *on the flight deck of USS NASSAU, LHA-4. (U. S. Navy)

U. S. Marine Corps aircraft operated from assault ships, aircraft carriers, and land bases in support of Operation Iraqi Freedom. Among the types used were F/A-18A+, F/A-18C and F/A-18D Hornets, AV-8B II+ and AV-8B Night Attack Harriers, EA-6B Prowlers, KC-130 Hercules fixed wing aircraft, and AH-1W Super Cobra, UH-1N Huey, CH-46E Sea Knight, and CH-53E Sea Stallion helicopters. Marine units based on the aircraft carriers and assault ships included the following:

USS CONSTELLATION, CV-64 (Persian Gulf)
VMFA-323 Death Rattlers, F/A-18C

USS HARRY S. TRUMAN, CVN-75 (Mediterranean Sea)
VMFA-115 Silver Eagles, F/A-18A+

USS TARAWA, LHA-1 (Persian Gulf)
VMA-311 Tomcats, AV-8B II+ & AV-8B Night Attack
HMLA-267 Stingers, AH-1W & UH-1N
HMM-161 Greyhawks, CH-46E
HMH-361 Flying Tigers, CH-53E

USS SAIPAN, LHA-2 (Persian Gulf)
HMLA-269 Gunrunners, AH-1W & UH-1N
HMH-464 Condors, CH-53E

USS NASSAU, LHA-4 (Persian Gulf)
VMA-231 Ace of Spades, AV-8B II+
HMLA-269 Gunrunners, AH-1W & UH-1N
HMM-263 Red Lions, CH-46E
HMH-772 Flying Armadillos, CH-53E

USS KEARSARGE, LHD-3 (Persian Gulf)
VMA-223 Bulldogs, AV-8B II+
HMH-464 Condors, CH-53E
HMM-162 Golden Eagles, CH-46E

USS BOXER, LHD-4 (Persian Gulf)
HMH-465 Warhorses, CH-53E

USS BATAAN, LHD-5 (Persian Gulf)
VMA-542 Flying Tigers, AV-8B II+ & AV-8B Night Attack
HMM-365 Sky Knights, CH-46E

USS BON HOMME RICHARD, LHD-6 (Persian Gulf)
VMA-311 Tomcats, AV-8B II+
HMM-165 White Knights, CH-46E

USS IWO JIMA, LHD-7 (Mediterranean Sea)
VMA-233 Bulldogs, AV-8B II+
HMLA-167 Warriors, AH-1W & UH-1N
HMM-264 Black Knights, CH-46F
HMH-461 Iron Horse, CH-53E

Some squadrons operated from more than one ship.

An AV-8B Harrier II+ from VMA-231 begins its take-off roll on the flight deck of USS NASSAU, LHA-4, for a mission over Iraq on April 7, 2003. The aircraft carries a GBU-16 laser guided bomb under its left wing and an AN/AAQ-28 Litening II target designator pod under the right wing. Most of the seventy USMC Harriers used in Operation Iraqi Freedom were AV-8B II+ version, but some night attack variants, as shown on page 2, were also used. (U. S. Navy)

Marine Corps aircraft were based on assault ships, aircraft carriers, and on land. This F/A-18D Hornet was assigned to VFMA(AW)-533, and it operated out of Kuwait during the war. It is loaded with a mix of external ordnance and stores including two fuel tanks under the fuselage and right wing, two BLU-110A/B unguided 1,000-pound bombs on the outboard pylon under the right wing, and four GBU-12D/B 500-pound laser guided bombs on the two pylons under the left wing. An AN/AAS-38C Targeting FLIR is mounted on the left cheek station, and an AN/AAR-50 Navigation FLIR is on the right cheek station. AIM-9M Sidewinders are on the wing tip stations. (USMC)

Above: Marine EA-6B Prowlers contributed to the air defense suppression efforts flying electronic warfare jamming missions and firing AGM-88 HARM anti-radiation missiles. This EA-6B was assigned to the Death Jesters of VMAQ-2 which operated out of Prince Sultan Air Base (PSAB), Saudi Arabia. The Banshees of VMAQ-1 also flew out of PSAB. (USMC)

Right: Marine KC-130s served as aerial tankers and also operated as cargo aircraft. This Hercules is delivering Meals-Ready-to-Eat (MRE) to Jalibah Air Base in southern Iraq on April 2. (USMC)

The AH-1W Super Cobra remains the attack helicopter in use with the U. S. Marine Corps. Here a Marine from Marine Wing Support Squadron 373's bulk fuel section refuels an AH-1W at a forward aircraft refueling point near Jalibah Air Base, Iraq, on March 22. The Super Cobra is armed with eight AGM-114 Hellfire missiles, two LAU-6B rocket pods with fourteen 2.75 rockets, and its three-barrel M197 20mm cannon in a turret under the nose. Panels placed on the ground help reduce the amount of sand kicked up by the rotor blades. The hot refueling took place with the engines running to minimize the amount of time on the ground. (USMC)

An AH-1W receives last minute checks before launching from USS SAIPAN, LHA-2. The Super Cobra is assigned to Light Attack Helicopter Squadron 269 (HMLA-269) which is part of Marine Air Group 29 based at New River Air Station, North Carolina. (USMC)

Armed with Hellfire missiles, 2.75-inch rockets, and its 20mm cannon, an AH-1W takes off from an assault ship to support Marine ground forces in Iraq. The large exhausts for the helicopter's two General Electric T700-GE-401 jet engines are clearly visible. (USMC)

Marine light attack helicopter units have a combination of AH-1W Super Cobras and UH-1N Huey helicopters. The UH-1Ns are used for command and control, combat assault, medical evacuation, maritime special operations, supporting arms control and coordination, fire support, and security for forward and rear area forces. They can be armed with 7.62mm or .50-caliber machine guns, or a GAU-17 7.62mm minigun. LAU-68 seven-round or LAU-61 nineteen-round 2.75-inch rocket pods can also be carried. Thirty UH-1Ns were deployed by the Marines as compared to fifty-eight AH-1Ws. Here a UH-1N creates a sand storm as it takes off during operations near AD Diwaniyah, Iraq, on March 30. (USMC)

The CH-46E Sea Knight is the medium lift assault helicopter used by the Marines to insert troops, supplies, and equipment to key points on the battlefield. It is also used to remove troops and evacuate casualties. With its rear loading door open, Marines hustle across the flight deck of USS SAIPAN (LHA-2) to a waiting CH-46E. In addition to the Marines, the Sea Knight carries a combat crew of five, including a pilot, co-pilot, crew chief, and two gunners who operate machine guns. The helicopter has been in service for almost forty years, and a replacement is desperately needed. Interim measures have been taken to keep the CH-46E in service past its life expectancy, but as yet no replacement has been determined. (USMC)

A CH-46E lifts off from USS SAIPAN as two CH-53Es wait their turns further aft. (USMC)

Two Sea Knights land on a road near Jalibah, Iraq, to be refueled before continuing their mission. (USMC)

The CH-53E Super Stallion provides the Marines with a heavy lift helicopter capability. It can take off with a load weighing 16 tons carried internally or on a sling beneath the helicopter. Equipment as large and as heavy as a light armored vehicle (LAV) or a howitzer can be transported inside the CH-53E. Powered by three General Electric T64-GE-416 turboshaft jet engines, it carries a crew of three and can be armed with two .50-caliber machine guns. With its rotor blades and tail section folded to save space, a Super Stallion is transported down to the hangar bay on the port elevator aboard USS KEARSARGE, LHD-3. Note the long refueling probe on the front of the helicopter that allows it to refuel in flight from aerial tankers. (USMC)

U. S. AIR FORCE
THE STRATEGIC BOMBING CAMPAIGN

Above: The U. S. Air Force used all three of its strategic bombers to destroy targets in Iraq. A dramatic contrast of technologies and aircraft developed decades apart is illustrated in this photograph of a B-2A Spirit stealth bomber taxiing out to the runway on the island base of Diego Garcia while a B-52H Stratofortress takes off in the background. (USAF)

Below: A B-2A Spirit moves in on a tanker for an in-flight refueling. During Operation Iraqi Freedom, B-2s flew missions from Diego Garcia and all the way from the United States to hit important command and control targets in Iraq. The missions flown from the continental United States took over thirty-six hours and required several in-flight refuelings. (USAF)

Above: Loaded with GBU-31 JDAMs under its wings, a B-52H heads to its targets in Iraq. Although it is by far the oldest bomber in the U. S. inventory, twenty-eight B-52Hs were deployed for Operation Iraqi Freedom compared to eleven B-1Bs and four B-2As. (USAF)

Left: The pilot of a B-52H carefully maneuvers his huge aircraft under a tanker as he prepares to execute an in-flight refueling from a KC-135R. (USAF)

Below: A B-52H from the 23rd Bomb Squadron taxis out on the runway at RAF Fairford, UK, for its 100th combat mission. All bombers which took part in Operation Iraqi Freedom were temporarily assigned to the 40th Expeditionary Bomb Squadron. (USAF)

Eleven B-1B Lancers from the 37th Bomb Squadron of the 20th Bomb Wing operated out of Thumrait, Oman, during Operation Iraqi Freedom. Flying an American flag from the cockpit, the crew of this Lancer displays their pride as they return to their home at Ellsworth Air Force Base, South Dakota, on May 13, 2003. (USAF)

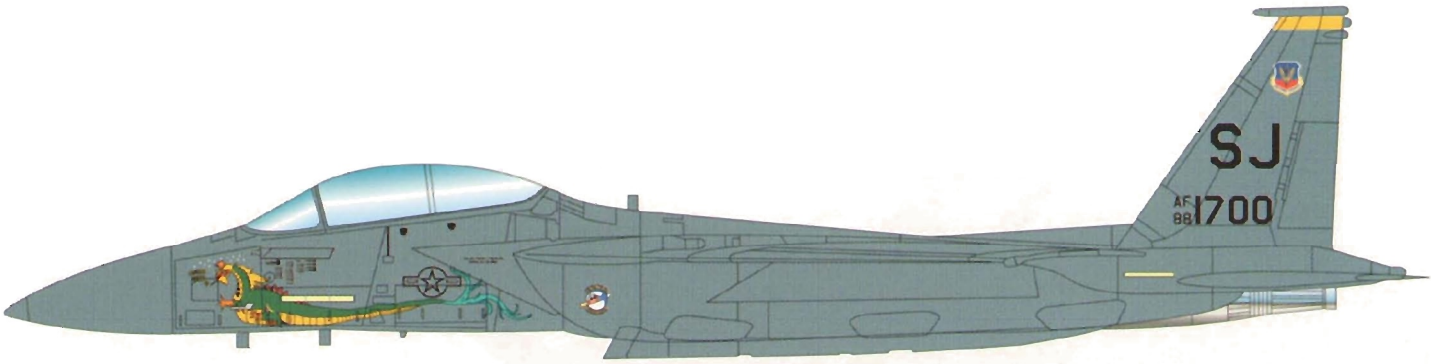
Left: GBU-31(V)-1/B Joint Direct Attack Munitions (JDAM) are loaded on the rotary launcher of a B-1B in preparation for a mission to strike targets in Iraq. This JDAM uses the Mk 84 2,000-pound high explosive warhead. (USAF)

Above: GBU-31(V)-3/B JDAMs are prepared for loading on a B-1B. This version of the JDAM employs the BLU-109/B penetrator warhead. B-1Bs were often loaded with both types of the GBU-31s so that the pilot could select the best type for any target of opportunity he might be ordered to attack during a mission. Two of each type were dropped on a building in Baghdad on April 7 when it was thought that Saddam Hussein and other members of his regime were in the building. (USAF)

Above: Only twelve F-117A Nighthawks were used in Operation Iraqi Freedom. The stealth fighters were the Black Sheep from the 8th Fighter Squadron of the 49th Fighter Wing, and they deployed from their home at Holloman Air Force Base, New Mexico, to Al Udeid Air Base, Qatar. The pilot of one of the F-117As is greeted as he makes a stop at Langley Air Force Base, Virginia, during his trip back to New Mexico. (USAF)

Below: On the night of March 20, two F-117As each dropped two GBU-27A/B guided bombs on a structure in Baghdad where Saddam Hussein was thought to be located. One of the two aircraft that flew the mission is shown trailing its parabrake upon its return to Al Udeid Air Base after that attack. The F-117As deployed to the Middle East on February 3rd, and they returned home by the end of April. (USAF)

THE TACTICAL AIR CAMPAIGN



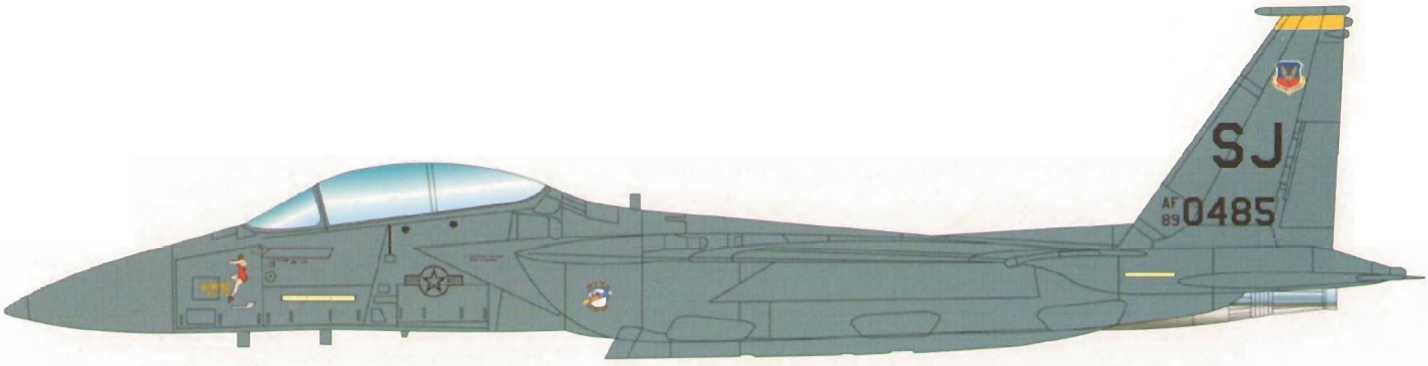
This F-15E Strike Eagle from the 336th Fighter Squadron (Rocketeers) of the 4th Fighter Wing displays a large nose art in the form of a multi-colored dragon. Named "Dragon Betty," the art was similar to that used on a B-24 Liberator named "The Dragon and His Tail" that flew in World War II. The F-15E shown in this artwork, and that on the next page, are available on decal sheets for scale models by Cutting Edge. These can be obtained from Meteor Productions at *meteorprod.com.* ***(Meteor Productions)***

The United States Air Force deployed 293 fighter aircraft to support the war effort. These flew 8,828 missions between the time the war began and when President Bush declared that the major combat phase was over. Only twelve of the fighters were F-117A Nighthawks which delivered GBU-27 and EGBU-27 guided bombs against strategic targets. Some sorties flown by F-15E Strike Eagles were also of a strategic nature, but most missions flown by F-15Es and the other Air Force fighters were of a tactical nature.

When it became obvious that the Iraqi Air Force was going to sit the war out on the ground, F-15C Eagles were returned to their home bases. F-15E Strike Eagles employed laser guided bombs ranging in size from the 500-pound GBU-12 to one of the 5,000 pound GBU-28s. F-16C Fighting Falcons suppressed enemy air defenses with AGM-88 HARM anti-radiation missiles, destroyed armored vehicles with laser guided bombs, and delivered JDAMs against a wide variety of fixed targets. They also used standard cluster bomb units (CBU) and the new wind-corrected munition dispensers (WCMD) to attack Iraqi Army units in the field. A-10A and OA-10A Warthogs delivered standard 500-pound bombs against Iraqi troops and destroyed their vehicles with AGM-65 Maverick missiles.

Above: A pilot from the 67th Fighter Squadron takes off for a mission on March 23. The squadron's F-15Cs were first deployed to Prince Sultan Air Base, Saudi Arabia, then moved to Tabuk Air Base. Forty-two F-15Cs from the 67th Fighter Squadron (tail code ZZ), the 1st Fighter Wing (tail code FF), and the 33rd Fighter Wing (tail code EG) were assigned to provide air cover during Operation Iraqi Freedom. When no threat materialized from Iraqi Air Force fighters, the F-15C Eagles got an early trip home. U. S. military leadership determined that multi-role fighters, including the F-15E, F-16, F-14, and F/A-18 could be used to counter any threat from Iraqi aircraft that might later materialize. However, no Iraqi fighters challenged coalition aircraft at any time. (USAF)

Right: An F-15C moves in on a tanker during a mission on March 20. It is armed with AIM-7M Sparrow missiles on its fuselage stations, AIM-120C AMRAAM missiles on the outer shoulder stations, and AIM-9M Sidewinder missiles on the inboard shoulder stations. (USAF)



This F-15E from the 4th Fighter Wing was originally named "Memphis Belle III," but this was later changed to "Memphis Belle IX." This was in honor of the famous B-17F Flying Fortress that carried the same name in World War II. The B-17F's nose art, featuring a girl in a swimsuit, was painted on the nose. (Meteor Productions)

Above: Forty-eight F-15E Strike Eagles from the 4th Fighter Wing at Seymour Johnson Air Force Base, North Carolina, deployed to Al Udeid Air Base, Qatar. These aircraft often flew missions loaded with GBU-12 LGBs which they used to destroy tanks and other armored vehicles. This is commonly known as "tank plinking." (USAF)

Left: Another F-15E moves in on a tanker to refuel. Although loaded with eight GBU-12 LGBs, it also carries two AIM-9M Sidewinders and two AIM-120C AMRAAM missiles. Using these missiles, along with its 20mm cannon, a Strike Eagle is more than capable of defending itself against enemy fighters. (USAF)

Above: An F-16CJ from the 20th Fighter Wing is heavily armed with two AGM-88 HARM anti-radiation missiles, two AIM-120B AMRAAMs, and one AIM-9M Sidewinder. The F-16CJ is the only version of the Fighting Falcon capable of employing the HARM. (USAF)

Left: The two F-16Cs in the foreground are loaded with GBU-10 LGBs, while the one in the background is armed with HARM missiles. All of the aircraft carry AIM-9M and AIM-120B air-to-air missiles for self-defense. (USAF)

An F-16CJ operating with the 363rd Air Expeditionary Wing takes off in a sand storm on March 25. For self-defense, it is armed with three AIM-120C AMRAAMs and one AIM-9M Sidewinder. To attack the Iraqi Army, it carries a cluster bomb unit (CBU) on each middle wing station. The gold colored tail section on each of the cluster bombs indicate that they are the new wind-corrected munitions dispensers (WCMD). This new type of CBU is counted as a guided munition. Three types of WCMDs were used during the war, and these included 818 CBU-103s, eighty-eight CBU-105 sensor fused weapons (SFW), and two CBU-107s. (USAF)

An A-10A taxis out for a mission against the Iraqi Army. It carries a mixed load of AGM-65 Maverick missiles, rocket pods, a SUU-25 flare dispenser, and 500-pound unguided bombs under its wings. Two AIM-9M Sidewinder missiles are carried outboard under the right wing for self-defense, while an AN/ALQ-184 electronic countermeasures (ECM) pod (not visible in the photograph) is on the left outboard station. The Warthog is assigned to the 172nd Fighter Squadron of the 110th Fighter Wing. This unit is part of the Michigan Air National Guard. It is shown here while operating as part of the Air Expeditionary Wing at a forward-deployed base in southern Iraq. (USAF)

Above center: The pilot of another A-10A from the 172nd FS watches the signals of a member of the 386th Transient Alert Team as he marshals aircraft. The AN/ALQ-184 ECM pod can be seen under the left wing of this Warthog. Two AGM-65 Maverick missiles and one AIM-9M Sidewinder missile arm this Warthog. (USAF)

Right: The most formidable weapon carried by the A-10A remains its internal, seven-barrel, 30mm GAU-8 cannon. This powerful gun system can easily destroy any armored vehicle, and once again it proved very effective in Operation Iraqi Freedom. A total of 311,597 rounds of 30mm ammunition were fired during the war. (USAF)

AIR FORCE SUPPORT AIRCRAFT

Although combat aircraft get the majority of the headlines and credit for success in war, they could not perform their missions without countless support aircraft carrying out a multitude of roles almost behind the scenes. Among the most essential of these is the strategic and tactical airlift of equipment, supplies, and personnel wherever they are needed. Months before the combat began, C-5B Galaxies, C-141B Starlifters, and C-17A Globemaster IIIs flew hundreds of missions transporting men and material to the Middle East. Once the war began, 124 C-130 Hercules and seven C-17As provided tactical airlift within the theater. The C-17A made its first combat personnel drop during Operation Iraqi Freedom. In this photo, a C-17A starts its engines at Naval Air Station North Island, California, for a mission to Southwest Asia on March 21. It carried eighty members of Helicopter Combat Search and Rescue/Special Warfare Support Squadron Five to the war zone. (USAF)

Not all C-130s perform tactical airlift missions. This EC-130H Compass Call was flown by the Scorpions of the 41st ECS during the war in Iraq. The EC-130H is an electronic countermeasures aircraft that has special equipment designed to jam enemy communications. It can be identified from standard C-130s by the numerous wire antennas on its tail section. Eight EC-130H Compass Call aircraft were sent to bases in Southwest Asia in support of Operation Iraqi Freedom. A like number of AC-130U gunships and HC-130Ps were also deployed for the war, as were twenty-six MC-130E Combat Talon special operations aircraft and a single DC-130 drone controller. (USAF)

Nine RC-135V and RC-135W Rivet Joint aircraft supported the war effort by gathering electronic intelligence (ELINT) as they listened in on enemy communications and other electronic transmissions. This RC-135W was flown by the 38th Reconnaissance Squadron from Prince Sultan Air Base, Saudi Arabia. Other RC-135s operated out of Thumrait, Oman. To perform their intelligence gathering missions, RC-135s have specialized equipment in an extended radome on the nose and large dielectric panels on each side of the forward fuselage. An array of antennas is also mounted beneath the fuselage. (USAF)

The command and control (C2) mission is another essential role played by support aircraft. In Operation Iraqi Freedom, nineteen E-3 AWACS (Airborne Warning and Control System) aircraft kept commanders apprised of what was happening in the air space over Iraq and allowed them to control strike aircraft in the air. In the photo above, an E-3 takes off in a sandstorm on March 25. Seven E-8 J-STARS (Joint Surveillance Target Attack Radar System) aircraft, like the one shown at right, watched the movements of enemy and friendly forces on the ground and provided commanders with real time information so that timely tactical decisions could be made. Between them, E-3s and E-8s flew a total of 432 C2 missions. (both USAF)

Fifteen U-2 Dragon Ladies were made available to CENTCOM for strategic reconnaissance over the war zone. Operation Iraqi Freedom marked the first time six U-2s flew on the same Air Tasking Order (ATO). The U-2 is a high altitude, multi-intelligence (MULTI-INT) reconnaissance aircraft. Today's version is much improved and considerably more advanced than the U-2 in which Francis Gary Powers was shot down in May 1960. It can fly at altitudes above 70,000 feet and provide near real-time imagery to commanders on the ground. In the center photograph, a crew from the 9th Aircraft Maintenance Squadron refuel a U-2S at Prince Sultan Air Base, Saudi Arabia, after a mission on April 13. The photo at right shows the state-of-the-art cockpit in today's U-2s. Continual upgrades in avionics, sensors, and powerplants have kept the U-2 a highly capable reconnaissance platform for almost half a century. (both USAF)

Above: For today's combat aircraft to operate over the modern battlefield, aerial refueling is absolutely essential. A total of 149 KC-135 Stratotankers were deployed to support the aircraft in Operation Iraqi Freedom. An F/A-18C from CVW-3 aboard USS HARRY S. TRUMAN, CVN-75, refuels from a KC-135R as it heads for Iraq from its carrier operating in the Mediterranean Sea. (USAF)

Below: The other U. S. Air Force tanker used in the war was the KC-10A Extender. Thirty-three of these huge aircraft refueled U. S. and other Coalition aircraft throughout the war. Here a KC-10A refuels a Royal Air Force Tornado and American F/A-18C Hornets. KC-135s and KC-10s flew a total of 6,193 missions during Operation Iraqi Freedom. (USAF)

The U. S. Air Force operated helicopters as part of the war effort as well as its fixed wing aircraft. Among these were sixteen HH-60G Pave Hawk rescue helicopters and eighteen MH-60G special operations aircraft. An HH-60G from the 301st Rescue Squadron throws up sand and debris as it takes off for a mission on April 3 from a forward deployed base inside southern Iraq. Rescue missions flown by the Air Force totalled 191. (USAF)

Center left: A crewman checks the microphone and headphones in his helmet before climbing aboard a Pave Hawk helicopter for a mission. A GAU-17 multi-barrel minigun is mounted in the right door of the helicopter. (USAF)

Center right: A member of the 66th Expeditionary Rescue Squadron checks over the GAU-16 .50-caliber machine gun on the left side of an HH-60G before a mission in Iraq. (USAF)

Left: Pararescuemen return with a downed pilot after a successful rescue mission in Iraq on April 8. (USAF)

AERIAL WEAPONS

With an oversized American flag flying from its mast, the guided missile destroyer USS DONALD COOK, DDG-75, launches a BGM-109 Tomahawk Land Attack Missile (TLAM) into Iraq during the night of April 4, 2003. Although not delivered by aircraft, the Tomahawk cruise missiles were considered part of the air campaign against Iraq. (U. S. Navy)

Carrying a variety of ordnance, an F/A-18C Hornet from VFA-105 aboard USS HARRY S. TRUMAN, CVN-75, heads toward its targets in Iraq. GBU-16 laser guided bombs (LGB) are carried on the outboard wing stations, and a GBU-35 JDAM is on the left inboard pylon. For defense against enemy aircraft, two AIM-9M Sidewinders are on the wing tip stations, and an AIM-120B AMRAAM is on the right cheek station. An AN/AAS-38 Targeting FLIR pod is on the left cheek station. (U. S. Navy)

WEAPONS EXPENDED IN THE AIR CAMPAIGN OF OPERATION IRAQI FREEDOM

Guided Munitions

BGM-109 Tomahawk Land Attack Missile	802
AGM-114 Hellfire	562
AGM-130 Skipper	4
AGM-154A JSOW	253
AGM-65 Maverick	918
AGM-84H SLAM (ER)	3
GM-86C/D CALCM	153
AGM-88C HARM	408
CBU-103 WCMD Combined Effects Munitions (CEM)	816
CBU-105 WCMD Sensor Fused Weapon (SFW)	88
BU-107 WCMD Positive Attack Weapon (PAW)	2
EGBU-27 GPS/LGB	98
GBU-10 LGB	236
GBU-12 LGB	7,114
GBU-16 LGB	1,233
GBU-24 LGB	23
GBU-27 LGB	11
GBU-28 LGB	1
GBU-31 JDAM	5,086
GBU-32 JDAM	768
GBU-35 JDAM	675
GBU-37 JDAM	13
United Kingdom Guided Weapons	679

Unguided Munitions

M117 750-pound bomb	1,625
Mk 82 500-pound bomb	5,504
Mk 83 1,000-pound bomb	1,692
Mk 84 2,000-pound bomb	6
CBU-87 Combined Effects Munition (CEM)	118
CBU-99 Rockeye II	182
United Kingdom Unguided Weapons	124

Ammnunition

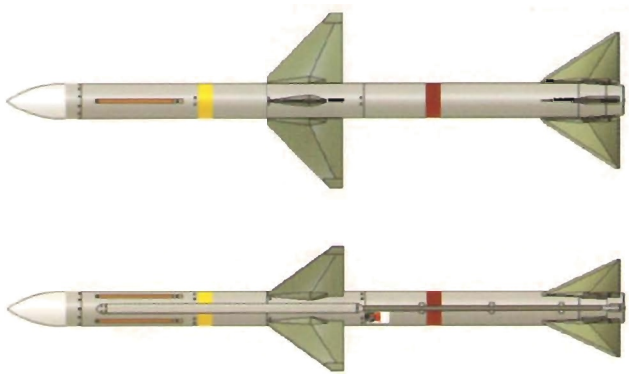
20mm	16,901
30mm	311,597

AIR-TO-AIR MISSILES

AIM-9M Sidewinder

Right: Almost fifty years after it was first introduced, the infrared-guided Sidewinder missile remains the most numerous of all U. S. air-to-air missiles. The AIM-9M is the version now in the inventory of all branches of the military, while the AIM-9X remains in development. AIM-9Ms were carried for defense on all types of U. S. fighters during Operation Iraqi Freedom. In this photograph, an AIM-9M shares the left glove pylon on an F-14 Tomcat with an AIM-54C Phoenix missile. After no air threat materialized during Operation Iraqi Freedom, AIM-54Cs were seldom, if ever, loaded on Tomcats. (U. S. Navy)

Although largely replaced by the AIM-120 AMRAAM, the AIM-7 Sparrow radar-guided missle remains in the U. S. inventory and is used by several foreign nations as well. This AIM-7M is loaded on the inboard right wing pylon of an F/A-18C Hornet. (B. Kinzey)



AIM-7M & AIM-7P Sparrow III

AIM-120B AMRAAM

AIM-120C AMRAAM

The AIM-120 Advanced Medium Range Air-to-Air Missile (AMRAAM) is the primary radar-guided aerial intercept missile in the U. S. inventory. The older AIM-120B has larger wings and fins than the newer AIM-120C. This AIM-120B is loaded on the right wing tip station of an F-16C Fighting Falcon. (USAF)

When Operation Iraqi Freedom began, U. S. fighter aircraft were well armed to meet any attacks by Iraqi aircraft. Some fighters were armed exclusively with air-to-air missiles and their internal 20mm cannon to counter any air threat that might materialize, but it soon became obvious that the Iraqi Air Force was going to sit the war out on the ground. Accordingly, fewer and fewer air-to-air missiles were carried on the fighters. Late in the war, fighters often carried only two AIM-9M Sidewinders for self-defense. On occasion, one or two AIM-120 AMRAAMs were carried as well, but not one air-to-air missile was fired during the war.

The artwork for all weapons is 1/48th scale or one inch equals four feet.

JOINT DIRECT ATTACK MUNITIONS (JDAM)

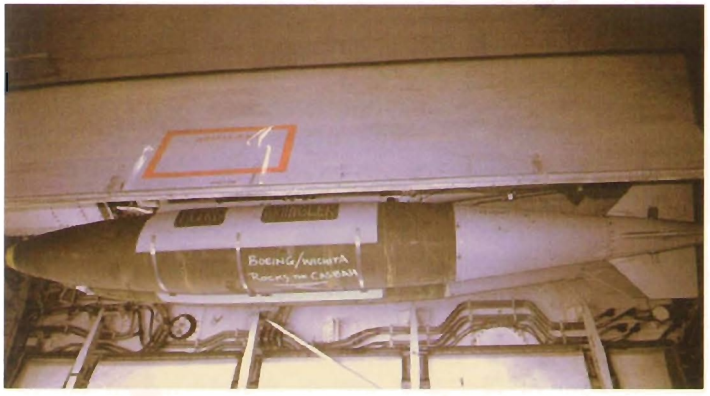
Joint Direct Attack Munitions (JDAM) were developed after the Gulf War of 1991. As relatively new additions to the inventory, they received a lot of coverage in the media during the war. Unfortunately, most of it was incorrect. The JDAM is not a single weapon, and although the M in the acronym stands for "munition," the JDAM is not actually a weapon itself. Instead, a JDAM is a guidance kit which uses the Global Positioning System (GPS) satellites to guide the weapon to a set of known coordinates. Standard existing warheads are used, and JDAM guidance kits are available for several warheads in the 1,000-pound and 2,000-pound classes. Kits for additional weapons are being developed. On this page and the next is a look at the JDAMs types used most extensively during Operation Iraqi Freedom.

GBU-32 (V)-2/B w/Mk 83 Mod 5 warhead (USN), rotated 45°

GBU-35(V)-1/B w/BLU-110A/B warhead (USN), rotated 205° with DSU-33B/B Radar Proximity Sensor

GBU-32(V)-2/B JDAMs are readied for their trip up to the flight deck of USS HARRY S. TRUMAN, CVN-75. Although often painted olive drab, these GBU-32s are painted gray. The two yellow bands indicate that the Mk 83, 1,000-pound warhead is used, and it is filled with H-6 explosive. Bombs used aboard Navy carriers have a rough exterior which is a protective thermal coating that helps prevent them from "cooking off" in the event of a fire aboard the carrier. This coating was added after bombs exploded during a serious fire on the flight deck of USS FORRESTAL, CVA-59, while operating off the coast of Vietnam. Bombs and JDAMs in the 1.000-pound class are used by the Navy and Marines, but not by the Air Force. During Operation Iraqi Freedom, the Air Force used only the larger bombs and JDAMS in the 2,000-pound class. (U. S. Navy)

GBU-35(V)-1/Bs are also in the 1,000-pound class used by the Navy, but the warhead associated with this type of JDAM is the BLU-110A/B. GBU-35(V)-1/B JDAMs are painted gray, and they have three yellow bands on the nose to indicate that the warheads are filled with PBXN-109 explosive. The JDAM guidance kits used for the GBU-35 series of weapons is identical to the one used on GBU-32s. In this photo, an MXU-735 nose plug covers the hole at the front of each weapon. These ordnancemen are waiting to move three GBU-35(V)-1/Bs to aircraft on the flight deck of USS ABRAHAM LINCOLN, CVN-72. In the color-coded system of shirts worn by flight deck personnel aboard U. S. aircraft carriers, those responsible for handling ordnance and arming the aircraft wear red shirts. (U. S. Navy)

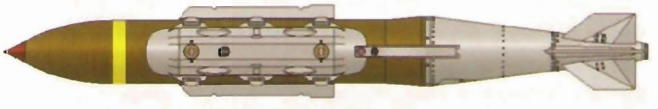


The standard Mk 84, 2,000-pound warhead is used for the Air Force GBU-31(V)-1/B and Navy GBU-31(V)-2B JDAMs. In this photograph, an Air Force GBU-31(V)-1/B is loaded in the weapons bay of a B-1B Lancer bomber. The inscription on the bomb is indicative that the JDAM guidance kits are manufactured by Boeing. The JDAM guidance kit for the GBU-31(V)-1/B and the GBU-31(V)-2/B are identical. All Air Force Mk 84s are painted olive drab, while Navy Mk 84s are painted both olive drab and gray. The JDAM kits are all painted gray. (USAF)

GBU-31(V)-1/B (USAF), rotated -38°

A GBU-31(V)-2/B is moved to waiting Super Hornets aboard USS ABRAHAM LINCOLN, CVN-72. Its two yellow bands indicate that the Mk 84 warhead is filled with H-6 explosive. Although it carries the same designation, the artwork of the JDAMs immediately above the photo shows a gray BLU-117A/B warhead with three yellow bands indicating that it is filled with PBXN-109 explosive. (U. S. Navy)

Ordnancemen in the magazine storage area deep within an aircraft carrier work to assemble a GBU-31(V)-4/B JDAM which uses a 2,000-pound BLU-109A/B penetrator warhead. Note the gray color of the warhead and the three yellow bands around the nose. (U. S. Navy)



GBU-31(V)-3/B (USAF), top view

GBU-31(V)-4/B (USN), rotated 135°

GBU-31(V)-3/B JDAMs are loaded on a B-1B Lancer. The BLU-109/B warheads used with this Air Force version of the JDAM are painted olive drab and have a single yellow band around the forward section. Like the Mk 84, BLU-109 warheads are in the 2,000-pound class, but they have a smaller amount of explosive inside. Instead, much of the weapon's weight, as well as its design, is used to allow it to penetrate underground bunkers and other hardened targets. A single B-1B dropped two high explosive GBU-31(V)-1/Bs and two GBU-31(V)-3/B penetrator JDAMs on a building where Saddam Hussein was thought to be located on April 7, 2003. (USAF)

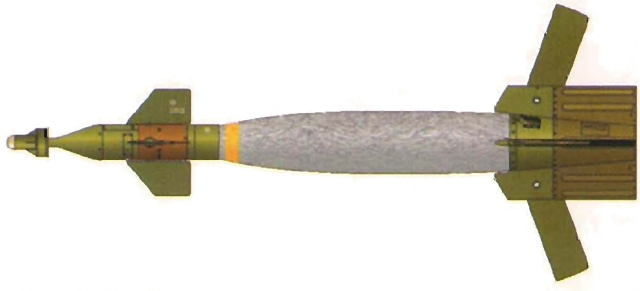
LASER GUIDED BOMBS (LGB)

Like JDAMs, laser guided bombs (LGB) are simply existing warheads to which laser guidance kits have been attached. One exception is the GBU-28, 5,000-pound "Deep Throat" bomb which was hastily developed during Operation Desert Storm. It featured a special warhead that was combined with the same laser guidance kit used on the GBU-27. The special warhead, which was made from an Army howitzer barrel, was filled with 675-pounds of Tritonal explosive. The massive weapon was designed to penetrate bunkers up to 100 feet underground. This large BLU-113 warhead is only used as part of GBU-28 and GBU-37 laser guided bombs. All other LGBs use standard high explosive or penetrator warheads ranging from 500 pounds to 2,000 pounds in size. Although it could be used as an unguided bomb, the BLU-109 penetrator warhead is only used with a laser guidance kit or a JDAM GPS kit. On this page and the next is a look at the most common laser guided bombs used during Operation Iraqi Freedom. The advantage of present laser guided bombs over JDAMs is that the laser guided bombs can be used against moving targets, while most of today's JDAMs are effective only against fixed targets with known GPS coordinates.

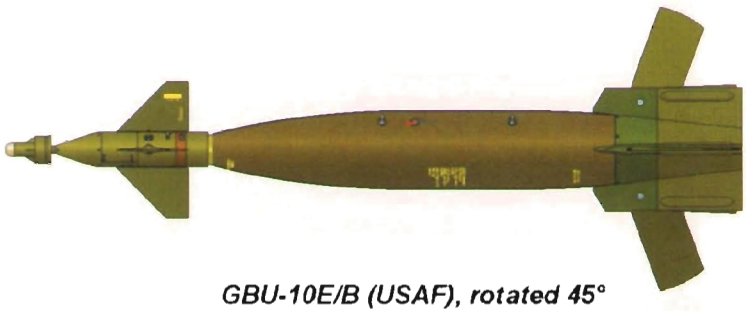
By far, the LGB used in the greatest numbers during Operation Iraqi Freedom was the GBU-12. In fact, with 7,114 having been dropped, more GBU-12s were used than any other bomb or missile of any type. It utilizes a Mk 82, 500-pound bomb as its warhead. In the photograph above, an F-15E crewman checks out the GBU-12s on his Strike Eagle before a mission. At right, four GBU-12D/Bs are loaded on a Marine F/A-18D Hornet. This is the same F/A-18D as shown in the top photograph on page 23. (Above, USAF, right, USMC)

GBU-12D/B w/Mk 82 Mod 2 warhead (USN), rotated –45°

GBU-16s are employed only by the Navy and Marines and use the Mk 83, 1,000-pound bomb as its warhead. They are operational on F-14, F/A-18, and AV-8B aircraft. In the photo above, four GBU-16s are loaded on an F-14D Super Tomcat assigned to the Bounty Hunters of VF-2 aboard USS CONSTELLATION, CV-64. At right, ordnancemen from VFA-113 move three GBU-16s to one of their F/A-18C Hornets aboard USS ABRAHAM LINCOLN, CVN-72. A total of 1,233 GBU-16s were used in Operation Iraqi Freedom. (Both, U. S. Navy)



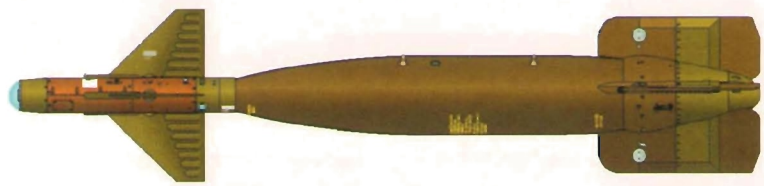
GBU-16B/B w/Mk 83 Mod 5 warhead (USN), rotated –135°



GBU-10E/B (USAF), rotated 45°

Left: The GBU-10 series of LGBs uses Mk 84 and the newer BLU-117 high explosive warheads, as well as BLU-109 penetrator warheads. These were the oldest laser guided bombs used in Operation Iraqi Freedom, and they were employed only by the U. S. Air Force. Only 236 GBU-10s were dropped, but this was the largest number of any laser guided bombs in the 2,000-pound class. Instead most of the heavy precision guided weapons used were the newer GBU-31 series of JDAMs.

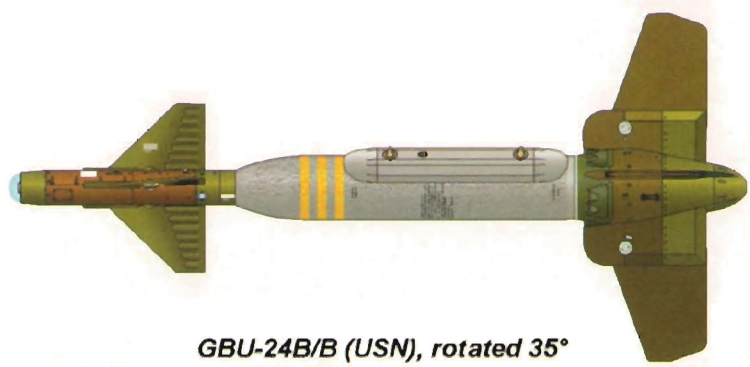
Right: Like the GBU-10, the GBU-24 series of bombs use warheads in the 2,000-pound class. The newer laser seeker head is visible on the front of the weapon. This GBU-24/B is an Air Force weapon that uses the Mk 84 high explosive warhead. Only twenty-three GBU-24s of all types were used during Operation Iraqi Freedom.



GBU-24/B (USAF), rotated 39.5°

GBU-24A/B (USAF), side view

Left: The GBU-24A/B uses the same guidance kit as the GBU-24B, but the BLU-109/B penetrator warhead is used instead of the Mk 84. An attachment known as a turtleback is mounted on top of the warhead to provide the necessary clearance between the weapon and the aircraft.



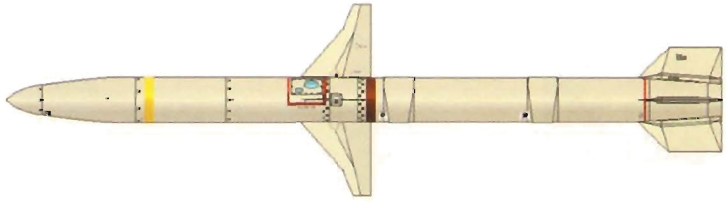
GBU-24B/B (USN), rotated 35°

The GBU-24B/B is the largest laser guided bomb used by the U. S. Navy. It features a BLU-109A/B penetrator warhead filled with PBXN-109 explosive as indicated by the three yellow bands. A slightly different turtleback is used to provide adequate separation between the weapon and the aircraft. A GBU-24B/B is shown loaded on an F/A-18C Hornet in the center left photograph. (Detail & Scale photo)

GBU-27/B (F-117A), rotated 45°

The GBU-27 was developed specifically for use on the F-117A Nighthawk. The fin section is similar to that used on the GBU-10 series of laser guided bombs. This eliminates the need for the turtleback. The guidance head is like the one used on GBU-24s except that the guidance fins have been clipped to allow them to fit inside the weapons bay of the F-117A. A shorter adapter ring is also used to attach the guidance section to the warhead. (B. Kinzey)

AIR-TO-GROUND MISSILES (AGM)



AGM-88 HARM

The AGM-88 High-speed Anti-Radiation Missile (HARM) is designed to attack enemy radar sites. The guidance system of the missile homes in on the radiation generated by the radars. A total of 408 HARMs were launched during Operation Iraqi Freedom. They were employed by EA-6B, F/A-18, and F-16CJ aircraft. (U. S. Navy)

The AGM-65 Maverick is a tactical air-to-surface missile used by the Air Force, Navy, and Marines to attack a wide variety of targets on the ground and at sea. It is effective in the interdiction, defense suppression, and close air support roles. An electro-optical guidance system is used in the AGM-65A and B versions, while the D and G versions use infrared imaging. The AGM-65E has a laser guidance system, and the F model uses infrared homing guidance. For Operation Iraqi Freedom, AGM-65s were employed by A-10, F-16, F/A-18, AV-8B, and P-3C aircraft. Here, a Maverick is moved to an armament elevator aboard USS CONSTELLATION, CV-64. (U. S. Navy)

Armorers check out AGM-114 Hellfire missiles on a Marine AH-1W Super Cobra helicopter. An LAU-68 rocket pod with seven 2.75-inch rockets is loaded inboard of the Hellfires. The AGM-114 is an air-to-ground, laser guided missile which is usually employed against tanks and other armored vehicles. Hellfires are used on Marine AH-1W Super Cobras, Navy SH-60B and HH-60H Seahawks, and Army AH-64 Apache and Kiowa helicopters. They can also be launched from the MQ-1 version of the Predator unmanned aerial vehicle. (U. S. Navy)

Ordnancemen inspect two Joint Stand-off Weapons (JSOW) on the flight deck of USS ABRAHAM LINCOLN, CVN-72. Initially deployed in 1999, the AGM-154A JSOW can be launched at a point between fifteen and sixty-five miles from the target depending on the aircraft's altitude. This increases aircraft survivability in a high threat environment. It is operational with F/A-18C/D/E/F, F-16C/D, F-15E, B-52H, and B-2A aircraft. JSOWs use a Global Positioning System/Inertial Navigation System (GPS/INS) guidance system. (U. S. Navy)

STANDARD BOMBS

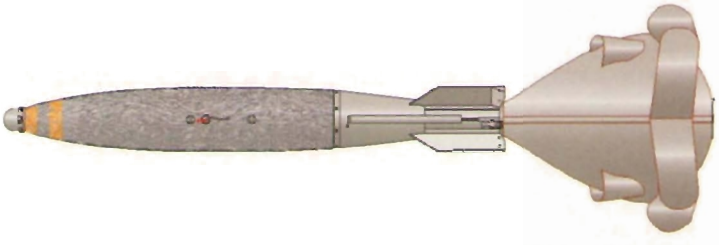
Mk 82 Mod 1, MAU-93/B conical fin (USAF), rotated 45°

Mk 82 Mod 2, DSU-33B/B Radar Proximity Sensor, & BSU-33B/B conical fin (USN), rotated 45°

Top left: One-third of the weapons employed by coalition aircraft during Operation Iraqi Freedom were standard unguided munitions. While not as numerous nor as well publicized as the more sophisticated precision guided weapons, the unguided ordnance played an important part in the successful air campaign. More than 5,500 Mk 82, 500-pound bombs were dropped by fighter and bomber aircraft. In this photo, Mk 82 Mod 1s are being loaded on an A-10 Warthog. (USAF)

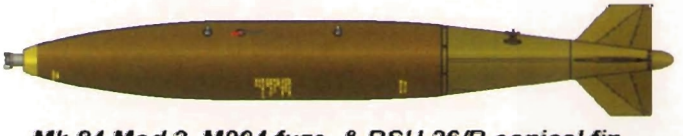
Left: M117, 750-pound bombs are used exclusively by B-52H Stratofortresses to carpet bomb area targets like troops in the field. Different fin sections are used on the M117 depending on the needs of the particular mission. The fin section shown in the photograph is the MAU-103 low drag fin, while the MAU-91 fin section allows the pilot to select between a low drag or high drag configuration before dropping the bomb. Here, an M117 is loaded on a B-52H at night. (USAF)

Mk 83 Mod 4, BSU-35/B conical fin (USMC), rotated 45°



Mk 83 Mod 5, BSU-85/B ballute fin (USN), top view

Mk 83, and BLU-110 1,000-pound bombs are used only by the Navy and Marines. The artwork above shows two Mk 83 weapons, while at left, a BLU-110 is prepared for loading on an F/A-18E Super Hornet. (U. S. Navy)



Mk 84 Mod 2, M904 fuze, & BSU-36/B conical fin (USAF), rotated 45°

Although used extensively in Desert Storm, only six Mk 84, 2,000-pound bombs were dropped in Operation Iraqi Freedom. Instead, most of the warheads were used for GBU-10 laser guided bombs and GBU-31 JDAMs. At left, a Mk 84, Mod 6 is loaded on an F/A-18C. (B. Kinzey)

COALITION PARTNERS

A Harrier GR.7 is loaded with two UK 1,000-pound laser guided bombs and two Sidewinder air-to-air missiles as it taxis forward out of its shelter. (RAF)

Although the United States deployed the most aircraft to Southwest Asia in support of Operation Iraqi Freedom, the United Kingdom and the Australians flew combat missions, while the Kuwaiti Air Force stood alert to defend against any air attacks by the Iraqi Air Force.

The Royal Air Force deployed sixty-six fighters including fourteen Tornado F.3s, thirty Tornado GR.4s, eighteen Harrier GR.7s, and four Jaguars. Additionally, eight VC-10 tankers, four E-3D AWACS command and control aircraft, seven Nimrod R.1 and MR.2s, two Canberra PR.9s, and a number of Chinook, Puma, Lynx, and Gazelle helicopters were also sent to bases in Southwest Asiat to support the war effort and UK troops on the ground.

During the war, Royal Air Force fighters expended 679 guided weapons and 124 unguided munitions. Among the guided weapons was the first combat use of the Storm Shadow stand-off cruise missle. Among the other guided weapons used by the RAF were ALARM anti-radiation missiles and several types of laser guided bombs.

RAF fixed-wing aircraft flew a total of 2,481 missions during the war. Of these, 1,736 were flown by fighters, while 359 tanker missions were conducted. The E-3Ds made 112 command and control flights, while 273 reconnaissance sorties were flown. A single mission, not placed in any one of these categories, was also flown bringing the total to 2,481.

A Tornado GR.4 is armed with laser guided bombs as it taxis out to the runway for another mission into Iraq. The RAF deployed thirty GR.4s in support of Operation Iraqi Freedom. (RAF)

Above: In a display of Coalition unity, RAF Tornado F.3 fighters wait their turn to refuel from a USAF KC-10 tanker while escorting a B-1B Lancer bomber on a mission to Iraq. (USAF)

Right: An Air Launched Anti-Radiation Missile (ALARM) is loaded under the fuselage of a Tornado GR.4. The ALARM is comparable to the American AGM-88 HARM and is used to destroy enemy radar sites by homing in on the radar's emissions. (RAF)

Below: A Tornado GR.4 is loaded with a Storm Shadow stand-off cruise missile beneath its fuselage as it taxis out for a night mission. The Storm Shadow made its combat debut during Operation Iraqi Freedom. (RAF)

In the months leading up to the war, military forces of all types crammed into Kuwait, thus becoming possible targets of the Iraqi Air Force. Kuwait Air Force KAF-18C Hornets stood alert ready to intercept any Iraqi aircraft that flew south toward Kuwait. Fortunately, no such attacks were ever made by the Iraqi Air Force. These two photographs show Hornets of the Kuwaiti Air Force armed with Sidewinder and Sparrow air-to-air missiles. Exemplifying the cooperation between the forces of different nations, the Kuwaiti aircraft are being refueled by U. S. Marine ground personnel. (USMC)

The Royal Australian Air Force deployed fourteen AF/A-18A Hornet fighters in support of Operation Iraqi Freedom, and they flew 302 missions during the war. These two photographs show two of the Australian Hornets carrying GBU-12 laser guided bombs as they fly into Iraq. The RAAF also deployed eight support aircraft as part of the Coalition forces. (USAF)

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